WAFFEN & RÜSTUNGEN

des Zweiten Weltkriegs

GUN & ARMOUR

COMPILED AND EDITED BY

Peter Frederick Model

Forward

These rules are a reformatted and upgraded version of the original Korps Commander Rules dated August 1988. If Players wish to use the original rules, they should always purchase an official version of the rules.

Korps Commander v2.0 to v2.2 include a number of basic changes to the original rules as well as a number of additional rules concepts. The primary objective is to speed up play allowing players to easily complete a one day game within a real day of play and introducing the option of playing competition games which can be completed in half a day, or less.

Text in this font represent standard Rules, mostly identical to the original Korps Command v1.0, but also containing a number of corrections, changes and additions.

Text in this font represents examples of play.

Text in this font represents Figure or Table Descriptions

Boxed Text represents an original rules "Case" which has been duplicated in full, or part. Its purpose is to allow players to reference this rules "Case" without the need of looking through the rules book. Only when a reference is critical in understanding a rules "Case" or "Concept" does this occur. Supporting references, which are not critical, are not duplicated.

Boxed and shaded text represents a description of a major change or addition to the original Korps Commander v1.0, in order to assist players in understanding what the changes are and how they affect the game.

This version of the rules is dedicated to B.A. Rea-Taylor, while other saw only the possibility of skirmish scale simulations, B.A. Rea-Taylor had the vision to see beyond. May he Rest in Peace.

Key

The term "Base" or "Counter" is used to describe a Base with 1 or more figures or vehicles on it, as well as a separate figure without a base, such as an aircraft. A "Base" or "Counter" is also called an Element.

The term "Company" is used to describe the smallest manoeuvre "Element" or "Unit" allowed in the game. In most cases a "Company" is made up of a single "Base" or "Counter". In some cases a "Company" can be made up of more than one "Base" or "Counter". This occurs when the Companies troop type consists of more than one weapon type. Rather than attempting to select one weapon type over the other or create a merged weapon type, the Company consists of more than one "Base", each of which represents the unique weapon type.

The original rules used the term "Unit" to describe a Base or Element; however this can cause some confusion and has been removed from the original rules text.

The term "Battalion" describes a number of Elements which make up a Battalion sized formation. The Battalion represents the basic combat and manoeuvre unit of the game.

The term "Battle-Group" represents a number of Battalions which make up a Regimental or Brigade sized formation. This represents the basic "Command" unit in the game, with each Battle-Group being commanded by a "Commander" or HQ Element (Base).

KORPS COMMANDER v2.3

[1.0] INTRODUCTION

Korps Commander is the WWII version of the "Corps Commander" Game System which allows players to recreate combat during WWII at a level which will allow large battles and campaigns to be fought. The series aim is to utilise the techniques of board-gaming whilst retaining the flavour of miniature gaming.

KORPS COMMANDER v2.0, v2.1, v2.2 & v2.3

Korps Commander v2.0/v2.1/v2.2/v2.3 includes a number of basic changes to the original rules. These include a change in the ground scale, Company scale and time scale.

A number of rules have been reworked in order to speed up play, such as Command, Fire Combat and Observation. As much as possible the original rules objectives are retained. Optional rules have been included in order to further speed up play. This is mainly related to command control, orders and communications.

The objective is to allow players to play a game to its final completion, within a reasonable time frame, where a clear winner and loser can be identified. Larger games would be played during a full day while smaller games could be played in 3 hours, allowing for competition play.

WRITERS COMMENTARY

When I initial undertook this project my vision was to make Korps Commander into a set of easy to learn and use rules for competition style play. Each time I revised the rules I increased the number of examples, cross references and added helpful commentary. This would occur whenever I came across a situation or rules concept which confused me and which took me a while to understand. In the heat of battle the time spent in trying to understand a rule or situation had to be as short as possible, so examples, diagrams and other helpful content was added to reduce this time frame.

This has improved the playability of the rules. I find now I can play a game without getting mentally bogged down trying to understand something, but the result has been a dramatic expansion in the size of the rules. In addition, being able to fully comprehend the rules has resulted in a dramatic increase of effect in doing anything. In the past I would sail through a game, missing or forgetting critical rules. Now I am fully aware of the full complexity of Bruce's original Game-System, thus my attempts at improving playability were quickly nullified by playing the full game system. This result is the optimum size of the forces remains at a Brigade sized battle-group.

I have come to the conclusion when Bruce took Challenger and created Corps Commander, he ensured all the realism and complexity of Challenger was present in Corps Commander. I must admit he did a brilliant job at it, the visibility rules themselves are a work of art. Unfortunately he could not reduce the time to play such a complex set of rules to the same extent. Based on my experience it takes 4 hours to play a game involving 1 regiment each. This is a far cry from handling a full division. My changes have allowed you to expand your force to 2 regiments, but no more. The optimal battlefield size is probably 60cm wide by 120cm deep, or a large board-game map.

The correct answer is a total rewrite of the rules, basing them on the original rules and using the Elements of the old which make sense, but ending up with something that is totally different. While I am uncertain if I should do this, my continued editing of the old Korps Commander rules has become a labour of love rather than a solution to my original problem. I still feel there is some merit in this, but the result will be a SPI board-game sized map game involving a few regiments on each side.

Peter Frederick Model

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PART 10: DESIGN RATIONAL

[5.0] DESIGN RATIONAL

As much as possible my reasoning for the rules are contained in this area, this allows players to determine how reasonable the rules, game values and concepts are.

I have attempted to understand the original Bruce Rea Taylor thoughts behind these rules and ensure I remain true to them. However in a number of areas I am unable to fathom the thoughts or algorithm behind a number of rules mechanics and as such have been forced to create my own thoughts or algorithms.

In some circumstances I have attempted to simplify the rules and as such have needed to rethink some of the ideas behind the original rules in order to achieve this.

I have to apologies of the detail and complexity of some of the analysis, it may have been over kill, but on topics of interest I enjoy drilling down into the super fine detail.

[6.0] FIRE COMBAT (FE)

[6.1] OVERVIEW

Perhaps one of the key focus area in any set of Armour Vehicle Combat rules is the way Direct Fire is conducted against a Hard target. In simple terms what is the effect of a specific gun against a specific Hard targets armour. Apart from attempting to simply the process of conducting this type of combat I have generally copied the game values done by Bruce Rea Taylor in his original Corps Commander, Korps Commander and in some cases Firefly and Challenger.

As I have increased the types of weapons and the number of vehicles I have relied on converting the firefly values into Korps Commander values. I have relied on the work done by Nikkita in this effort, but have never really understood the reasoning behind the armour and fire values.

As the number of weapons and vehicles have increased this conversion process from Firefly and Challenger is beginning to reach its limits, so what I need is to derive a process which would allow players to create Fire Values for any weapon using some form of real life values.

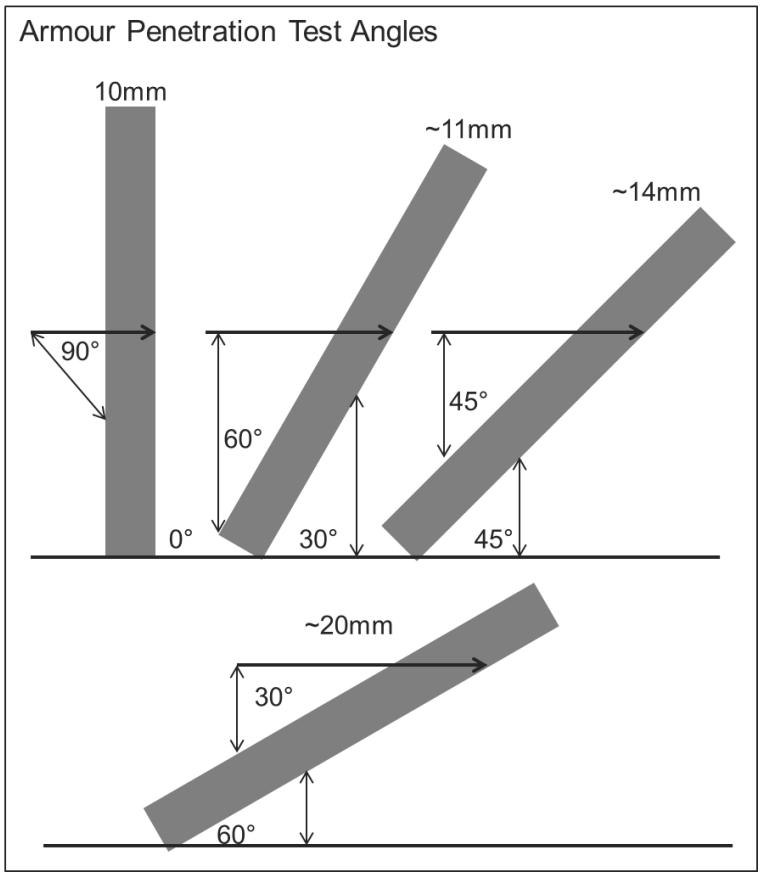


Fig [6.1a] Armour Penetration Test Angles

Note on Measurement: The angle specified in any test can be measures from the vertical or horizontal. Different nationalities used different methods. If 60° is specified, this is typically measures from the horizontal, which is the same as 30° from the vertical.

The bulk of testing was done at 90° (or 0°), which has the shot impacting the armour at right angles. This resulted in the shot travelling through 10mm of armour on armour with a thickness of 10mm.

The other common test performed at 60° (or 30°), in which case the shot needs to travel through 11mm of armour (on a 10mm armour sheet).

The French often uses 45°, in which case the shot needs to penetrate 14mm of armour (on a 10mm armour sheet).

The final angle of 30° from the horizontal (or 60° from vertical) was not used in WWII testing and has only been included as an example of the effect of increasing the armour slope.

The American's also used 20° from the horizontal (or 80° from vertical.)

As much as possible all armour penetration rates are 60° from the horizontal (or 30° from the vertical), other test results are converted accordingly.

Note: The British normally calculated armour slope from the vertical and the US from the horizontal.

When armour is on a slope the round has to penetrate more armour, as is shown in the chart above and below.

Armour	90°	60°	45°	30°
10 mm of armour	10mm	11mm	14mm	20mm

I have attempted to normalise all penetration rates to 30° from the horizontal (or 60° from vertical). From the surface we would assume a round would need to penetrate 10% additional armour, this would mean any armour penetration values using a 90° from vertical (or 0° from horizontal) would be divided by 1.1. Unfortunately when we look at tests where we have a number of angles, this is not reflected.

	90°	60°	45°		
Expected	110mm	100mm		1.1	
25mmL60 - 25 mm A/T gun SA 35	47mm	35mm	18mm	1.34	0.51
57mmL72.9 - 57 mm ZiS-2 M1941/43	145mm	100mm		1.45	
76.2 mm M1902/1930 (L40)	80mm	65mm		1.23	

Clearly the act of impacting an armoured face on an angle must cause deflection, which reduces penetration rate further. Based on the above values an average of 1.35 would be expected, so any 90° value would need to be divided by 1.35 to arrive at an estimation for 60°.

Converting 45° to 60° would require any 45° to be divided by 0.51. This seems high, but as we have almost no sole 45° values we can ignore this.

This is based on values provided and does seem unusual. Any APC round should have minimal deflection, so I am uncertain why the penetration values differ so much.

[6.11] Why So Much Detail

Korps Command is a set of rules which does not differentiate between ammunition types, except in the use of APDS and APCR rounds. If this is the case why am I going into so much detail concerning gun types and ammunition types.

The main reason was I used Firefly values to expand the FE values for Korps Commander, this required me to concern myself with ammunition types. Once I had all the ammo types in place I simply selected the best ammo and used that in Korps Commander.

The second reason is I developed a personal interest in ammo types and gun details, as it explained why, for example, the 17-pounder was such an effect weapon and why British guns in general were more effective than their calibre would otherwise indicate.

Understanding the ammunition used became important in understanding the effectiveness of different weapons at different periods of time. The classic example is HEAT ammunition. In 1940-41 it was not very effective when fired from rifled guns but by 1944 its effectiveness had dramaticaly improved. This was mainly top the efforts in reducing spin when fired from a rifled gun, as well as increasingly efficient designs. How tor eflect thjis becomes an issue.

[6.2] TREND

The key output I am looking for is the FE values for a weapon over its range. The starting point is to look at published armour penetration values. This exercise is not perfect as it depends on the testing method used, such as armour type, armour angle and the ranges selected. I have been forced to take the official values and convert them into something which is common, then to fill in gaps. This requires a lot of guess work and estimation, resulting in a table which has a reasonable error factor.

One interesting observation was the linear nature of the penetration rates, using 250m increments. I expected a curve rather than a straight line. This trend shows up clearly when looking at 75mm AP and 75mm APCBC penetration values, but is also visible for 37mm AP penetration values.

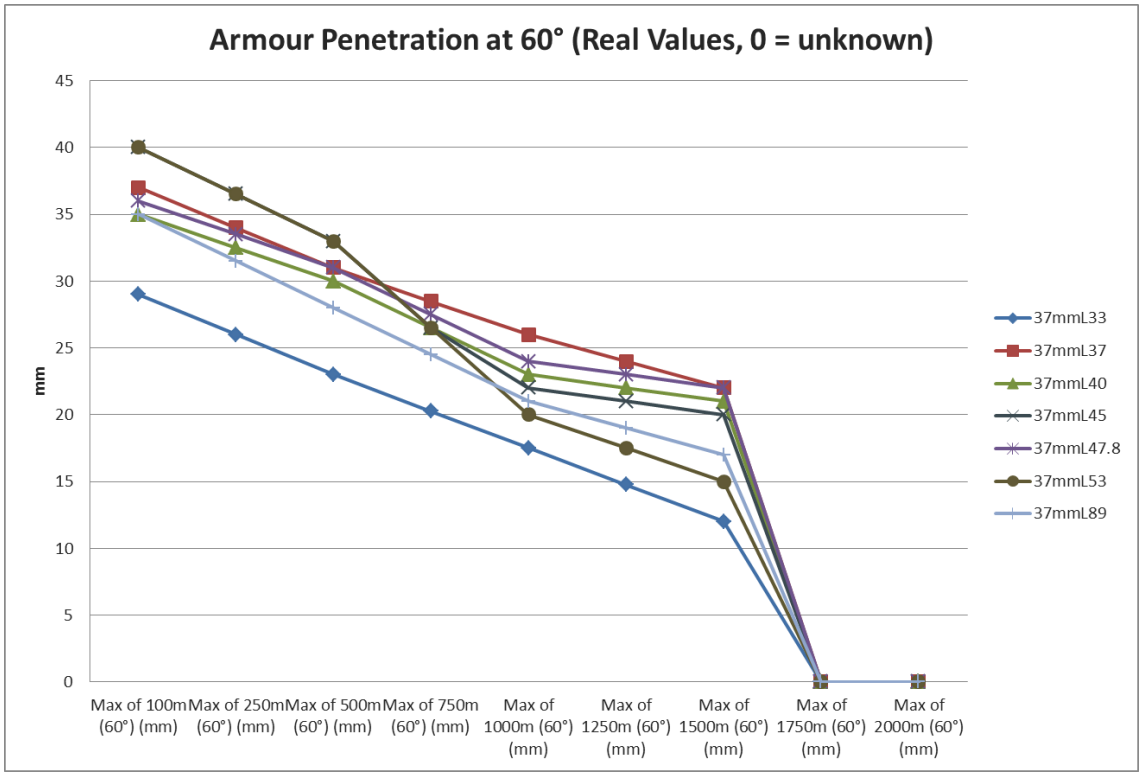


Fig [6.2a] 37mm AP Penetration values

Values are based on actual test results. Normalisation between two know values occurs. Only weapons with 4 or more data points have been included.

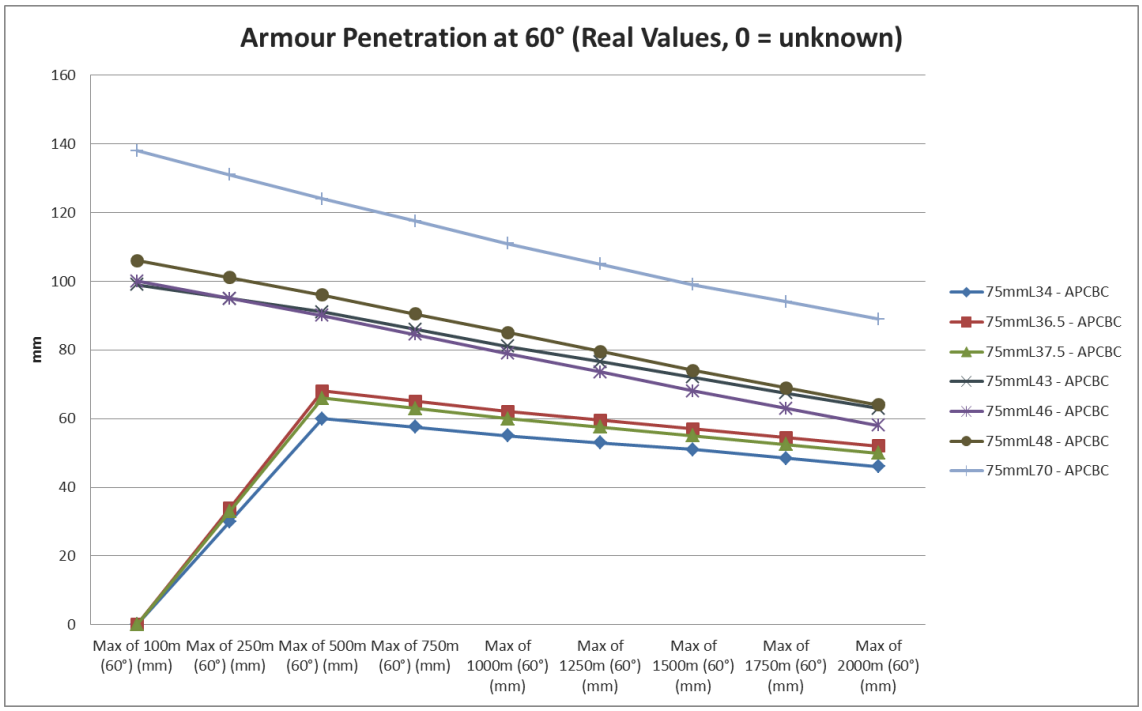


Fig [6.2b] *75mm APCBC Penetration values*

Values are based on actual test results. Normalisation between two know values occurs. Only weapons with 4 or more data points have been included.

My assumption is the straight line is due to the primary negative effect being wind resistance. A round fired in space retains its kinetic energy, irrespective of the distance travelled. On earth gravity and wind resistance slows down the round, reducing its kinetic energy. If the velocity is high, wind resistance is the primary effect. If velocity is low gravity quickly pulls the round down to earth. At ranges of 1000m to 2000m the velocity remains very high, so the primary effect is wind resistance which may have a linear effect on the velocity of the round. The other possibility is there is a curve, only at 1000m to 2000m it is too small to see, thus looks linear. Irrespective, at the ranges we are speaking of the effect of a round drops in a linear fashion which makes its easier for our purposes.

The other observation is the greater the length of the barrel the greater the effect, as the length of a barrel has an effect on velocity this is no surprise. While small the downward slope is greater when the barrel length is greater. If wind resistance is the primary effect this makes sense. The actual effect is impressive, a L70 is double the effect of a L34. A possible rule could be double the Length, double the effect.

The final observation is the downward slope is greater for the 37mm rounds compared with the 75mm round. This would be caused by mass, the 75mm round has more mass and thus has more kinetic energy, the 37mm is smaller, has less kinetic energy which dissipates at a greater rate due to wind resistance.

Conclusion: At the ranges up to 2000m the penetration effect of a round is linear. If there is a curve it's too small to see. This is especially evident for the 75mm guns.

The linear trend varies (Based on calibre, ammunition & length)

[6.3] AMMUNITION

Anti-tank weapons fired a number of different types of rounds, a brief list is as follows;

AP: Solid shot

APC: Solid shot with a cap of softer metal, this assists in penetrating armour.

APBC: Solid shot with a Ballistic cap, this is normally of thin metal and its only purpose is to reduce wind resistance.

APCBC: Solid shot with a cap of softer metal and a ballistic cap over this. Assists in penetration and reduces wind resistance.

APCR: A core made of a higher density metal surrounded by lower density metal. Assists in penetration.

APDS : A core made of a higher density metal surrounded by lower density metal with fall off when it leaves the barrel. Assists in penetration and has lower wind resistance.

APCNR: A core made of a higher density metal surrounded by lower density metal. Is fired from a barrel which tapers, the breech is larger than the barrel exit point. Has a dramatic increase in velocity, assists in penetration and has lower wind resistance.

APHE: A hollow round containing high explosive. The cap is normally solid shot with the explosive in the rear. If it penetrates the effect is more destructive, but has the poorest penetration of any of the above rounds.

HEAT: Shaped charge round using a stream of molten metal to punch through armour.

HEATi: Improved HEAT, either an improvement to the way the stream of molten metal is formed, or some method to reduce the effect of spin. Spin, which normally occurred when foired from a rifled barrel, has the effect of reducing the effectivness of the stream of molten metal.

The next area to look at is the round itself. We can see some interesting trends.

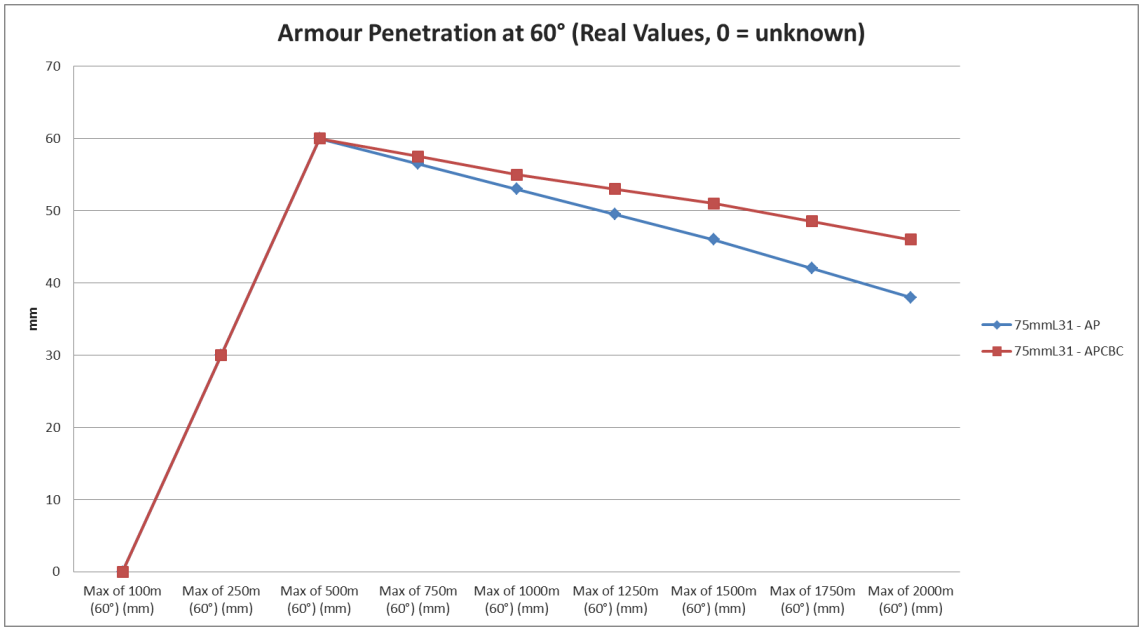


Fig [6.3a] 75mmL31 AP and APCBC comparison

Values are based on actual test results. Normalisation between two know values occurs. Only weapons with 4 or more data points have been included.

Comparing AP and APCBC values shows the APCBC has superior long range performance, as a Ballistic Cap provides reduced wind resistance, this makes sense.

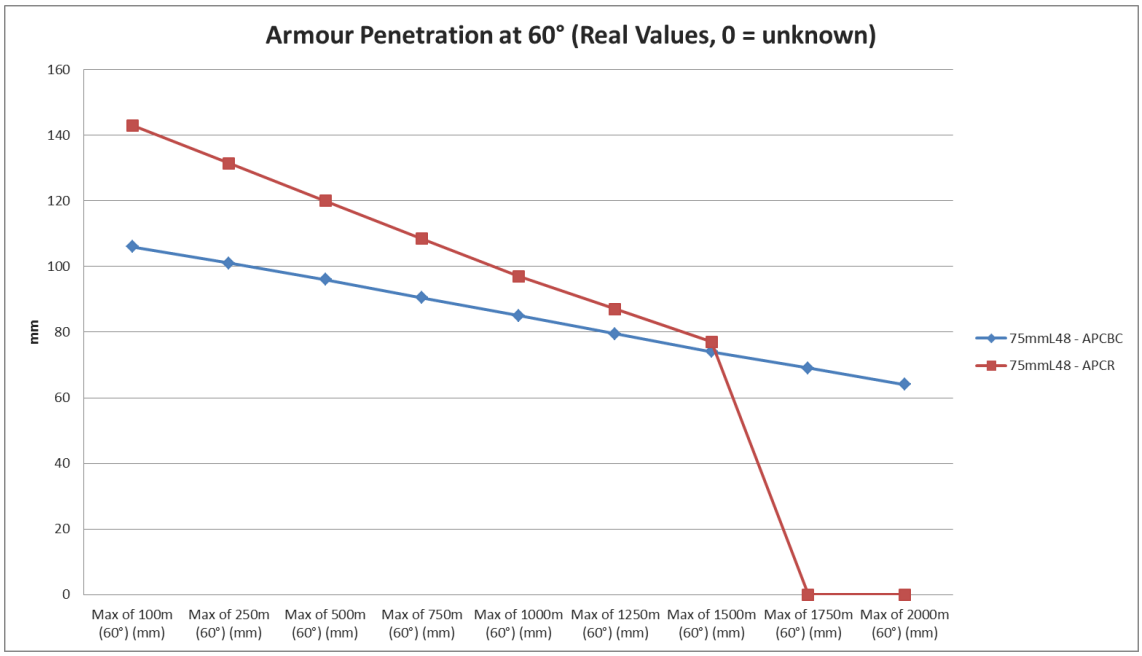


Fig [6.3b] *75mmL48 APCBC and APCR comparison*

Values are based on actual test results. Normalisation between two know values occurs. Only weapons with 4 or more data points have been included.

This comparison between APCBC and APCR is more complex, the short range performance of the APCR round is superior, as the core is a high density metal which can penetrate more armour this is reasonable. However its performance drops rapidly, this is because its mass is less as the solid core is surrounded by low density metal and thus it has less kinetic energy. At 1500m its still superior, but only just.

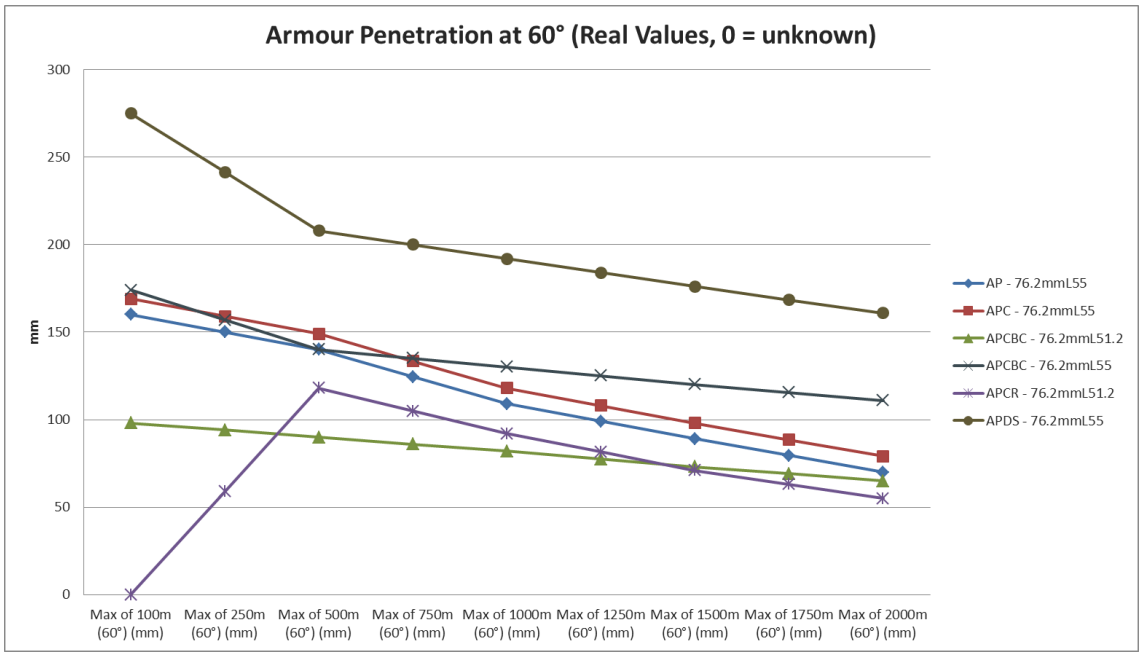


Fig [6.3c] *76.2mm AP, APC, APCBC & APDS comparison*

Values are based on actual test results. Normalisation between two know values occurs. Only weapons with 4 or more data points have been included.

For our final chart we see APDS with superior performance at all ranges, the benefits of APCR without the wind resistance issue. You can see the APDS performance trend is steeper (downwards) than the APCR and the APCDS rounds.

The APCBC has the range benefits discussed earlier and we can also see the penetration values of APC is slightly better than AP. As APC is designed to have superior penetration with the use of a soft metal cap this makes sense. Its trend is identical to AP, again this is expected.

Note the difference between the 76.2mmL55 and the 76.2mmL51.2.

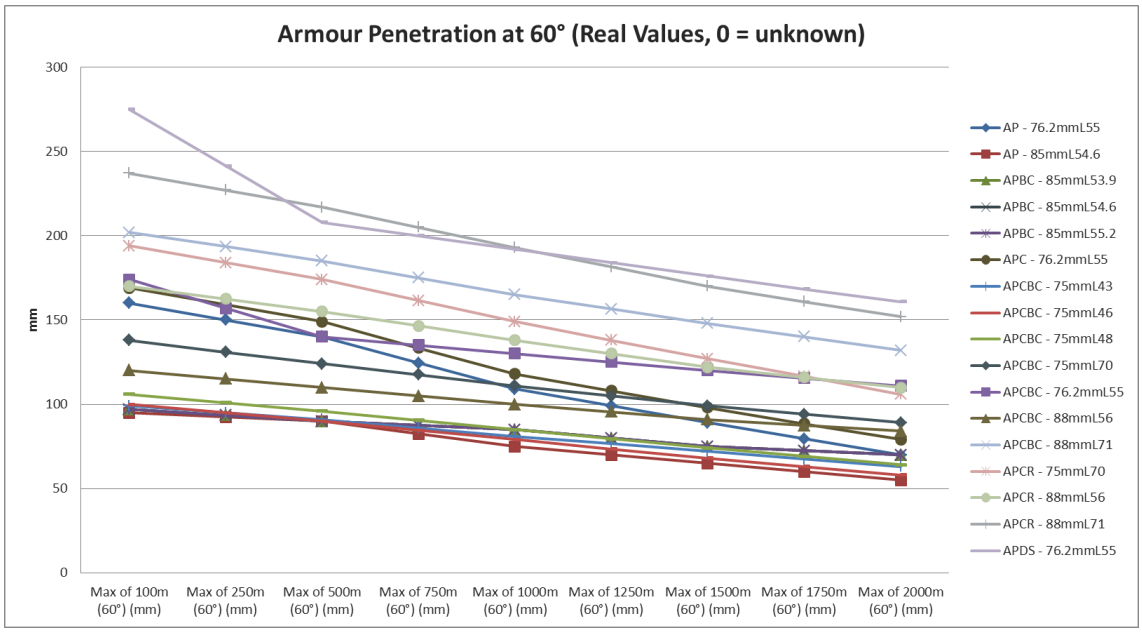


Fig [6.4d] *75/76/88 AP/APC/APCBC/APDS comparison*

The first thing which is noted is the 76.2mmL55 w/APDS is superior to an 88mmL71 w/APCBC. If the 88mmL71 has APCR, is about the same with greater effect at range. The 76.2mmL55 w/APDS at 100m seems too high and could be a data error or an anomalous value which should be ignored.

The other interesting trend is the 76.22mmL55 APC & AP, which has an unusual drop between 500m and 1000m.

Apart from the above the main point of this chart is to show the effect of round types, the APDC/APCR have the highest values, the APCBC in the middle and the AP/APC/APBC the lowest.

The Russia APBC round is of interest, I am uncertain if they were capped and suspect they were simple AP rounds with a ballistic cap to give it less wind resistance. If correct this could have been to reduce the cost of manufacturing a round. Putting a cap on a round does require a manufacturing effort, while manually placing a ballistic cap would be simpler. (A Cap has to be securely bound to the AP round somehow, a ballistic cap can be secured using friction only).

Conclusion: Different round have different performance and performance trends, examples;

AP: Lowest performance at 100m/500m (Trend is used as a base line)

APC: Slightly higher performance than AP at 100m/500m, trend is the same as AP.

APBC: Same performance as AP at 100m/500m, its trend “should” be better than AP (not as steep), however getting data to prove this is not easy to find.

APCBC: Same performance as APC at 100m/500m, its trend is better than APC (not as steep).

APCR: Much better performance than APC at 100m/500m, its trend is worse than APC (steeper), at 2000m is almost the same as APCBC. The performance at 100m/500m may be better than APDS due to higher mass and similar velocity – although comparisons between these two rounds is difficult to find. Its possible performance is the same as APCR at this range, but apart from the 76.2mmL55 the APCR is superior.

APDS: Superior performance at 100m/500m of any round except APCR/APCNR, its trend is worse than APCBC (steeper) and could be the same as APC giving it the best performance of any round at any range.

APCNR: Superior performance at 100m/500m of any round (Double APCBC), its trend is worse than APC (steeper), similar to APCR, if not worst.

[6.31] Estimated performance of a 75mmL48

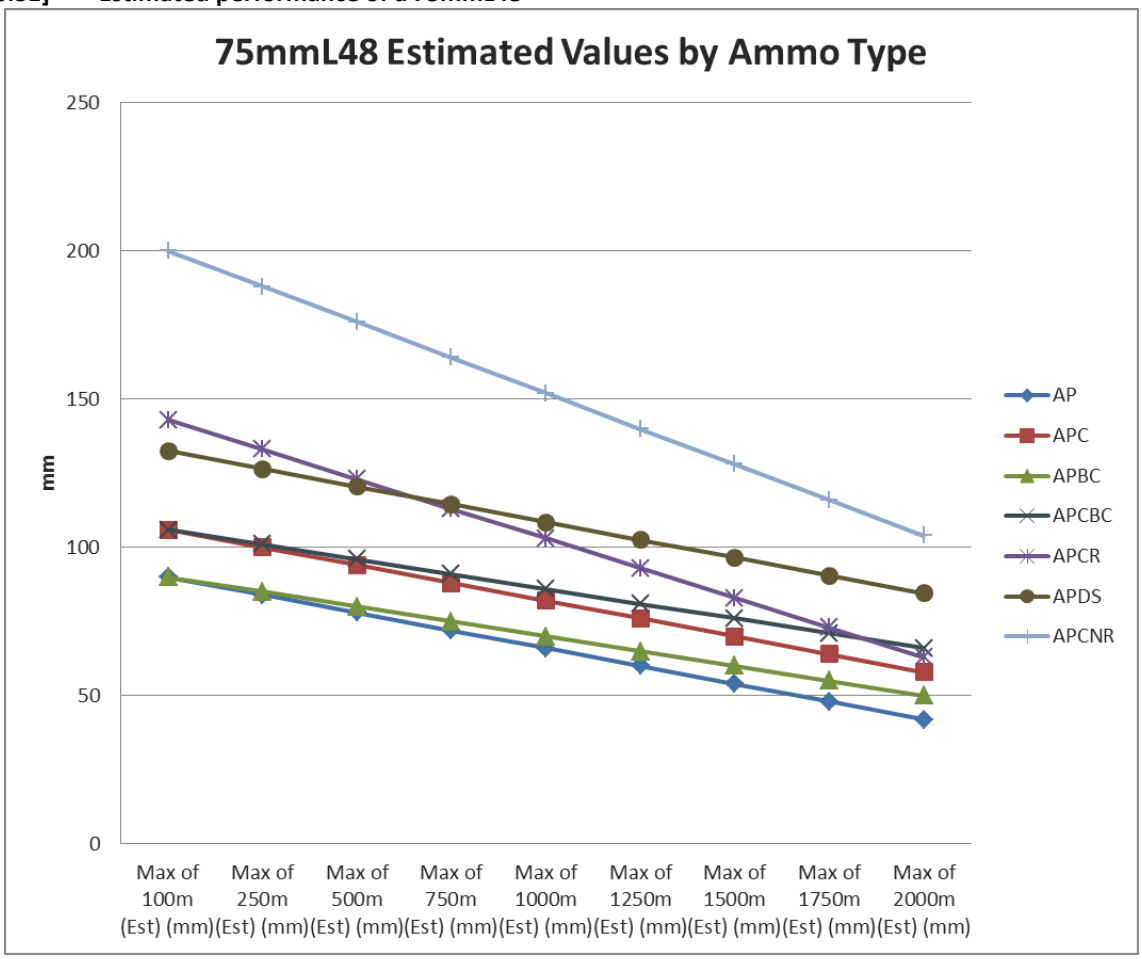


Fig [6.3e] Estimated performance of a 75mmL48 using different ammo types.

The above chart shows the theoretical performance of a 75mmL48 gun firing the different ammo types. Obviously no weapon would be able to fire all these ammo types, the APCNR requiring a very special barrel.

The formula's used are as follows;

Trend:

AP, APC & APDS dropping 6mm of penetration for each 250m (treating 100m as 0m)
APBC, APCBC dropping by 5mm of penetration for each 25m (treating 100m as 0m)
APCR dropping by 10mm of penetration for each 25m (treating 100m as 0m)
APCNR dropping by 12mm of penetration for each 25m (treating 100m as 0m)

Penetration at 100m:

APBC is the same as AP
APC & APCBC is 16mm of penetration greater than AP.
APCR is 53mm of penetration greater than AP.
APDS is 42mm of penetration greater than AP.
APCNR is 110mm of penetration greater than AP.

The formulas all show an absolute value, these could be converted to % based on the base value of AP at 100m (in this case 90mm).

[6.4] CALIBRE

Calibre represents the width of the barrel and round. Typical sizes are 20mm, 37mm, 45mm, 75mm, 76.2mm, 88mm, 90mm, 105mm, 122mm and 128mm.

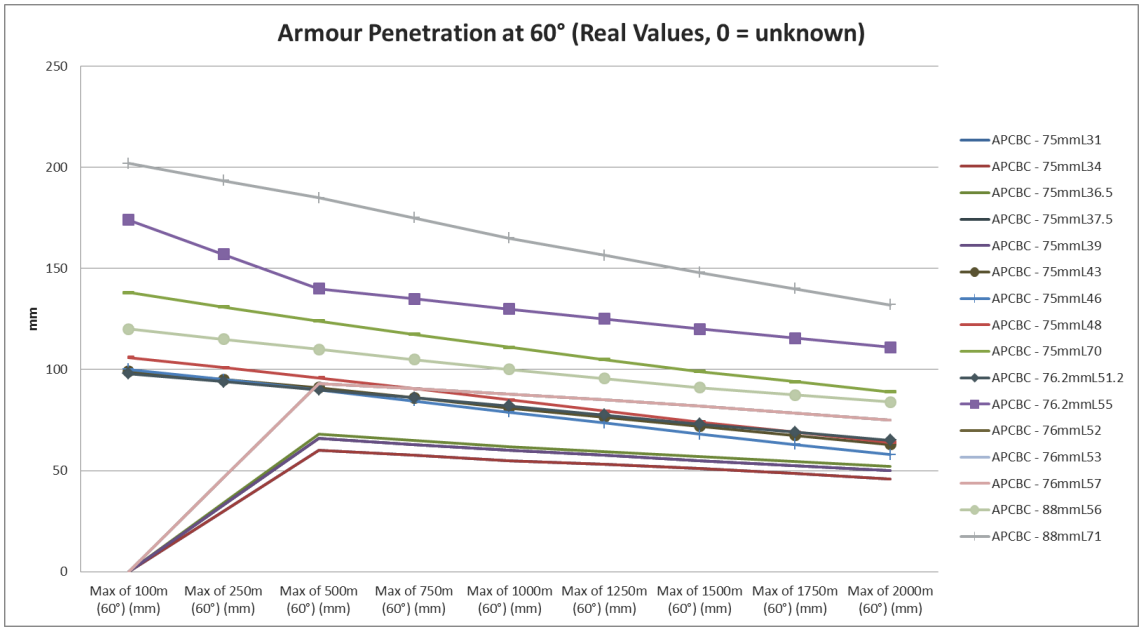


Fig [6.4a] 75/76/88 APCBC comparison

Surprise, the larger the calibre the greater the effect. The range is surprising, with the 88mmL70 having almost double the effect as a 75mmL70. You need to remember to take into account the length of the barrel, as this also has an effect. The 75mmL70 outperforms the 88mmL56, although by the time you get to 2000m its very close.

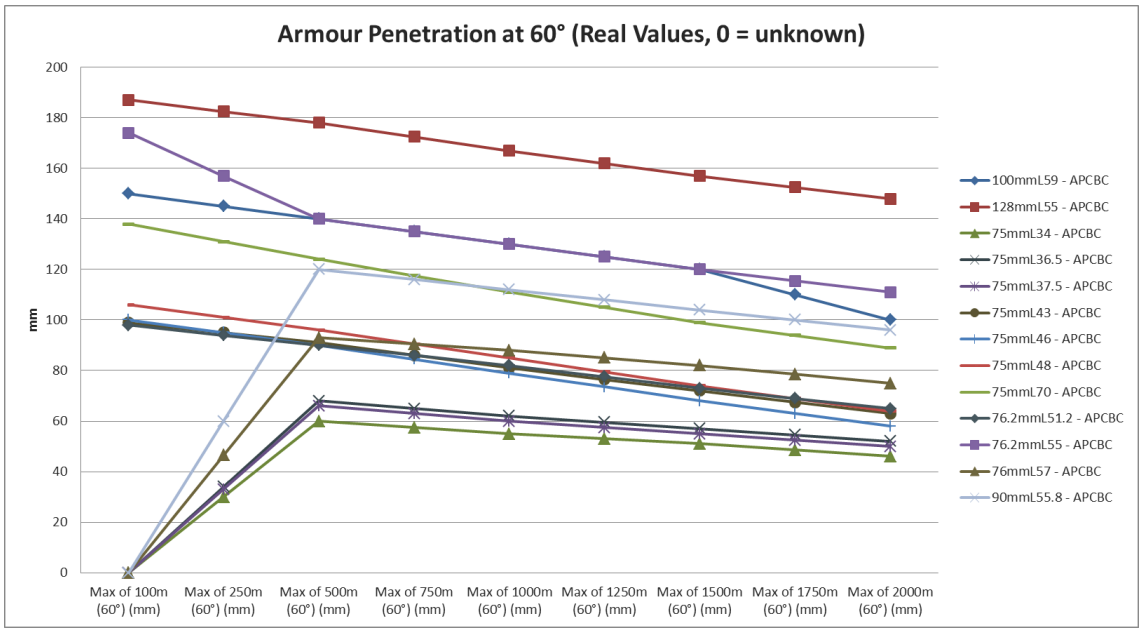


Fig [6.4a] *APCBC comparison (L48 to L57)*

This chart shows a wider range of calibres at similar lengths. This generally shows the larger calibres having better performance, however the 76.2mmL55 does cause us some trouble when comparing against the 100mmL59, for example.

Once again we see a trend line deviation for the 76.2mmL55, between 100m and 500m. We also see the opposite with the 100mmL59, between 1500m and 2000m. Apart from these two examples we see an almost straight line trend for all weapons. (I must admit there is a slight curve for the 75mmL70).

Conclusion: The larger the calibre, at the same length and using the same ammo, the greater the penetration. About 25% between 75mmL70 and 88mmL70, About 10% between the 75mmL48 and 88mmL56. The 76.2mmL55 is the exception, as it out performs the 88mmL53, but testing process could be the cause of this.

Any attempt to pin a value against these differences in calibre would be an exercise in guess work. I lack sufficient data to indicate if the differences could be linear or if there was some curve in the trend. Its even impossible to use a kinetic energy formula.

A good starting point would be to link the calibre to penetration in a linear fashion, so if a 75mm penetrates 75mm, an 88mm would penetrate 88mm at a 15% improvement. This seems to work when comparing German weapons with each other, especially 75mm and 88mm guns.

My preferred method is to use actual values for a weapon as much as possible and extrapolate accordingly.

[6.41] APC Estimated Values for L48 Gun

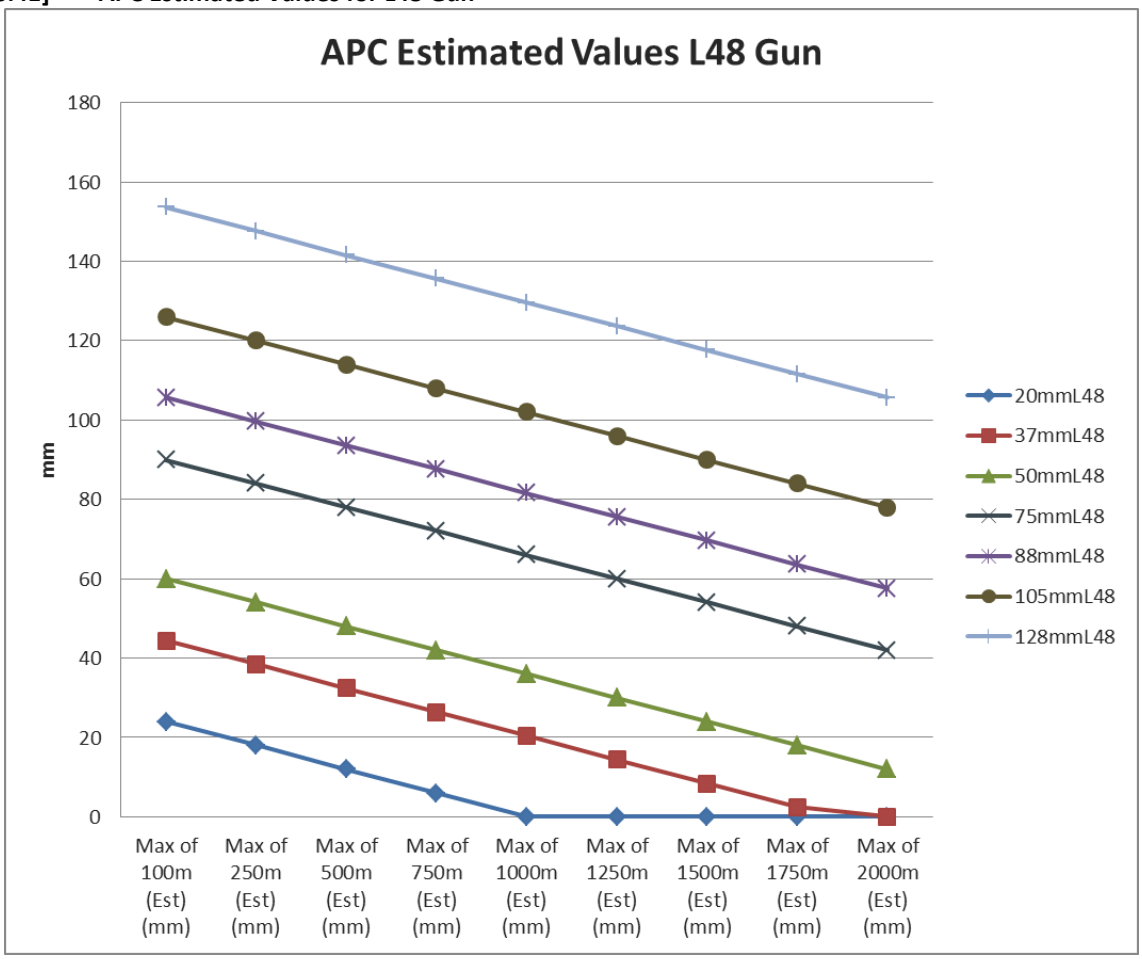


Fig [6.4q] Estimated performance of a L48 gun at different calibres.

While this chart is a gross oversimplification of reality, there are a number of values which do reflect reality. The area were we do have issues if with the guns which are manufactures with unusual quality, such as the British guns which had unusually good rifling and tolerances. I find this estimation is only good for weapons where we do not have any values for, if we have some good values we would use those. So the 76.2mmL55 gun would use real life values rather than the estimations detailed above.

[6.5] LENGTH

The final area to look at is gun length. This has a direct effect on velocity, which has an effect on penetration rates.

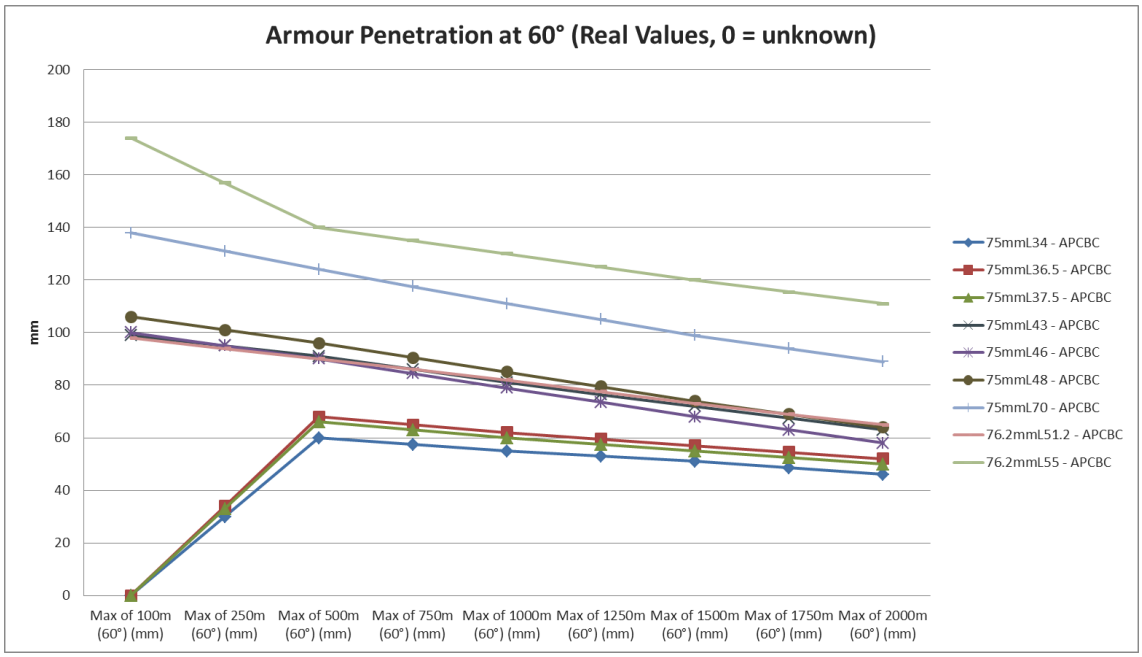


Fig [6.5a] 75mm APCBC comparisons

This chart shows 75mm Guns firing APCBC rounds. We can see the 75mmL34 at the bottom and the 75mmL70 at the top of the 75mm Guns. The 75mm guns with a length in the 40's are in the centre. (The 76.2mmL55 is at the very top)

The first observation is the trend line differences, the higher value weapons have a steeper negative trend than the lower weapons. The higher values would all be at a higher velocity, which would be affected more by wind resistance than lower velocity shells. The only unusual factor is all the guns with a length in the 30's have a specific trend, the guns with a length in the 40's have a different trend, but the 70's gun does not have a distinct trend. I would of expected the trend to be steeper than it shows up here.

The difference between L34 and L48 is almost 50% at 100m. This is a similar difference to the gap between L43 and L70.

My only theory is the L70 gun should have better short range performance by a significant factor, but at 2000m the value is correct. This would give it a steeper downward trend and give me the expected short range performance. The 76.2mmL55 seems to show this is possible, although this used higher quality ammunition and was a well engineered weapon. I suspect the German ammunition which was fired from the 75mmL70 was of poor quality and at very high velocity shattered. However at longer range the velocity dropped to the point the penetration values make sense.

Often when the Russians tested German guns they used ammunition found in the vehicle which late in the war was of poor quality. As a result they tended to underestimated German gun performance compared with their own guns, which were tested using high quality ammunition.

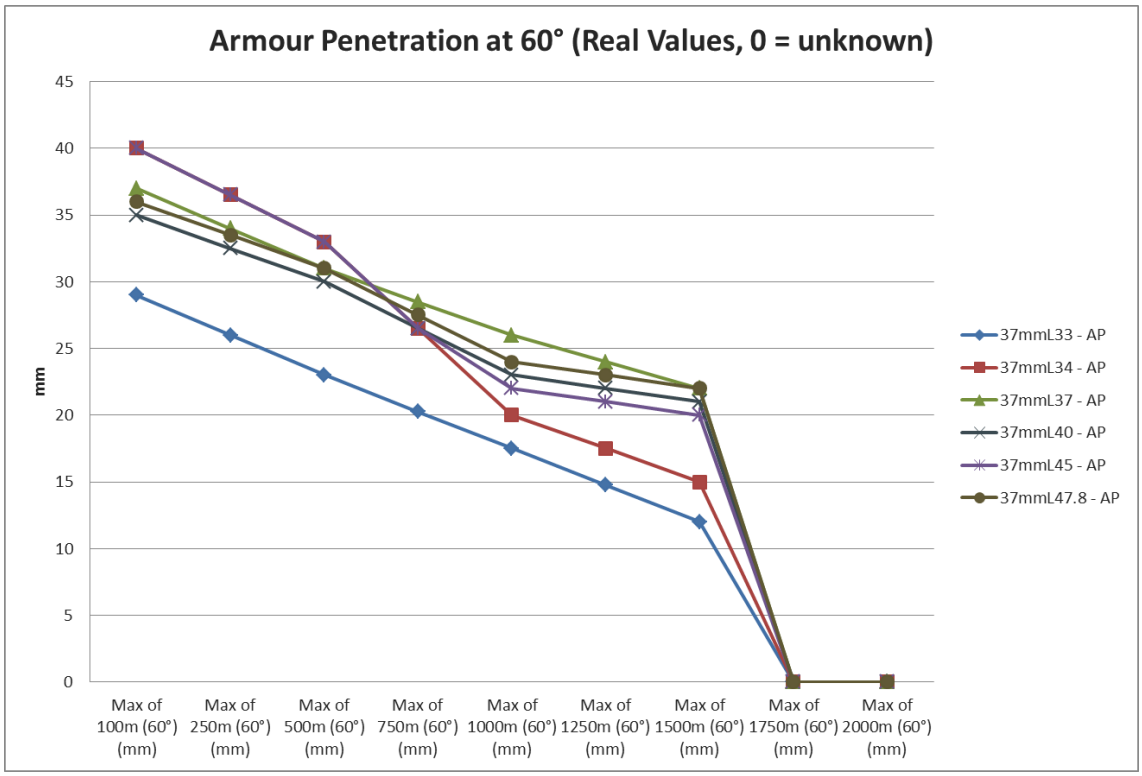


Fig [6.5b] *37mm AP comparisons*

Going back to an earlier diagram, this shows the penetration values of different 37mm guns, as can be seen the lowest performance is the L33 and L34, however the highest performance comes from the L37. Ignorning this weapon the L40 and L45 are at the top.

While two of the weapons have a linear performance, a number have an unusual dip between 500m and 1000m. Of these weapons, most return to their trend line as they move to 1500m. I would still tend to support the linear performance theory, but this shows there may be cases when this is not the case.

Conclusion: The longer the barrel length the higher the performance. There is a lack of data points to identify a possible performance improvement value based on barrel length.

Performance Improvements:

Shows a 32% improvement between 75mmL38 and 75mmL48 at 100m and 21% improvement at 2000m.

Shows a 27% improvement between 37mmL34 and 37mmL40 at 100m and 75% improvement at 1500m

The improved performance is not linear, the greater the length the lower the improvement. I assume that the lower the length the greater the improvement. (Only a 23% improvement at 100m between a 75mmL48 and 75mmL70, but at 2000m 28% improvement) A better assumption is the improvement is linear, but with an upward limit in terms of velocity.

[6.6] ACCURACY

If the assumptions made in this document is correct, why do most weapons have a maximum effective range which is less then a theoretical range which could still achieve penetration. After all a 20mm gun can fire at targets in the air to well beyond 2,000m, so why do most only have an effective range of less than 2000m. The answer must be accuracy.

We earlier indicated that of the two major effects, wind resistance and gravity, the effect of gravity was minimal at the effective ranges we are dealing with. At a very high velocity gravities effect is not noticeable, which is reflected in the penetration trend of a weapon. But as the velocity drops, the effect of gravity starts to take effect. It should be noted that there is an effect and there is a slight curve in the penetration trend line of any weapon, especially at the end of its effective range.

When a rounds velocity reduces to a point gravity takes effect, its direct fire accuracy becomes poor. There are quotes which indicate the high accuracy of the German 88mm was due to its straight line trajectory out to 1000m. There are also quotes which indicate German tank commanders on the eastern front asking for APCR or APCBC rounds instead of HEAT rounds, due to the low accuracy of HEAT at range. The Germans especially preferred to fire at range, due to the high penetration of their weapons at range and I assume the good accuracy.

(Wikipedia - HEAT) To illustrate this: a stationary Soviet T-62 tank, firing a (smoothbore) cannon at a range of 1000 meters against a target moving 19 km/h, was rated to have a first-round hit probability of 70% when firing a kinetic projectile. Under the same conditions, it could expect 25% when firing a HEAT round. This affects combat on open battlefield with long lines of sight; the same T-62 could expect a 70% first-round hit probability using HEAT rounds on target at 500 meters.

(Wikipedia – Tiger I) "The turrets were designed to mount the 8.8 cm KwK 43 L/71 gun. Combined with the Turmzielfernrohr 9d (German "turret telescopic sight") monocular sight by Leitz, which all but a few early Tiger IIs used, it was a very accurate and deadly weapon. During practice, the estimated probability of a first round hit on a 2 m (6 ft 7 in) high, 2.5 m (8 ft 2 in) wide target only dropped below 100 percent at ranges beyond 1,000 m (0.62 mi), to 95–97 percent at 1,500 metres (0.93 mi) and 85–87 percent at 2,000 m (1.2 mi), depending on ammunition type. Recorded combat performance was lower, but still over 80 percent at 1,000 m, in the 60s at 1,500 m and the 40s at 2,000 m. Penetration of armored plate inclined at 30 degrees was 202 and 132 mm (8.0 and 5.2 in) at 100 and 2,000 m (0.062 and 1.2 mi) respectively for the Panzergranate 39/43 projectile (PzGr—armor-piercing shell), and 238 and 153 mm (9.4 and 6.0 in) for the PzGr. 40/44 projectile between the same ranges. The Sprenggranate 43 (SpGr) high-explosive round was available for soft targets, or the Hohlgranate or Hohlgeschoss 39 (HlGr—HEAT or High explosive anti-tank warhead) round, which had 90 mm (3.5 in) penetration at any range, could be used as a dual-purpose munition against soft or armored targets"

(Jentz) In some WW2 tanks, yes, 2000m and beyond. The optics did allow engagement at these kinds of ranges. Some tanks had sights graduated out to 4000m. However - and it's a very important 'however' - even when the visibility conditions were excellent, the probability of a hit reduced fairly dramatically at extreme ranges; to a greater or lesser extent depending on the gun, the sights, the gunner's skill, the gunner remaining calm and a number of other variables. Even the type of round chosen could make a difference.

(The Purist) As a former gunner I can state that a gun will hit what you aim at, with flat trajectory up to (roughly) 60-65% of it muzzle velocity before gravity will begin to pull it down (which starts as soon as the shot leaves the barrel). ex: a gun has a muzzle velocity of 1000m/sec. If your sight and gun are in parallax you can point the gun at a target 650m away and the shot will hit the aiming mark without elevating the gun (within a few centimeters or inches depending on other conditions).

(nikolas93Ts) A muzzle velocity of 450m/s for a HEAT projectile would result in a range of 450m for a 50% first hit probability, and a range of 675m (1.5 × 450) to 900m (2 × 450) for the maximum effective range. At that range possibility would be probably around 15% if not even less,and rarely troops would have opened fire at distances longer than 500-600m. (I am speaking about WW2 rounds because their fuses had a limit or something).Yet,official ranges went easily over.

[6.61] The effect of gravity

If look at the maths, we can see any round will drop by 5m for each 1sec of flight,

S = (u*t) + (0.5*a) * (t)2 [s=ut+1/2 a (t)2]

s = distance (in this case the drop from the level)
u = initial vertical velocity
t = time
a = acceleration (in this case due to gravity)

If the round leaves the gun at 1000m/s assuming the gun is level, in 1 second, the round will drop (in theory) due to gravity:-

s = (0 * 1) + (0.5 * 10) * (1)2

In this case is zero (no vertical velocity as the gun is assumed to be level), a is acceleration due to gravity rounded to 10m per second per second and time is 1 (second).

s = 0 + (5X1)
s = 5m

In fact anything travelling for 1 second will fall approx 5m in the first second of flight due to gravity irrespective of other variables!

After 2 seconds the drop becomes 20m, 2 seconds to the power of 2 is 4, multiplied by 5.

Note: gravity varies slightly throughout the world (from 9.78 to 9.82.....and the convention is to use 9.8.....but 10 is often used for simplicity. The earth isn't a globe....it's slightly flatter that the poles and fatter at the equator!

In itself this is not an issue, as long as you know the range you simply dial it in and fire the weapon, the round will impact the position you aim at with minimal deviation, perhaps 5cm. The issue is you need to know the range, a 10% range error will cause the round to impact 50cm too high or 50cm too low over a 1 second flight. This explains why in testing the accuracy can range from 60% to 100%, because the range is known, while in actual action its much less.

For simplicity I am assuming no loss in velocity, which is not the case, at 2000m the drop becomes 20m, which means a 10% error in range becomes a drop of 200cm. I would assume any error factor would grow with distance. For Germany the maximum range a gun was designed to fire was 4000m, I assume a 88mmL71 or something similar. This was either in the optics or the mechanism designed into the gun to compensate for gravity, probably the latter.

As a typical tank was about 2 metres high, aiming for the centre would still get you a hit over a 1 second flight but would result in a miss over a 2 second flight.

Assuming my wild guess 10% range inaccuracy, the maximum reasonable range for a confirmed hit would be over a 1.5 second flight, or 1500m for a 1000m/s round. Of course a 2nd round, if the gunner was good, would hit if you could get a 2nd round off quickly enough. Also, if you are defending and have a good idea of the range of certain terrain features the accuracy would improve as well.

[6.62] For historical surveys of the ranges of tank engagements (Benn and Shephard, Gee, Hardison, and Zaloga and Ness)

WO 291/1212, "Ranges of engagement in the ATk battle" was published in December 1951 by E. Benn and R. W. Shephard. Shephard is one of the authors of "Applied Operations Research" (Plenum Press, New York, 1988, by Shephard, Hartley, Haysman, Thorpe and Bathe) which includes a problem based on this study and a table giving what appears to be the original raw data gleaned from unit war diaries.

The formula

$P = 1 – \exp(–R/K)$

was found to be a good expression for the proportion, P, of engagements that occur at ranges of less than R yards.

For NW Europe, K is about 950 yards.

90% of engagements occur at less than 2200 yards;
80% of engagements occur at less than 1500 yards;
50% of engagements occur at less than 650 yards.

AORG Memo no. C6, "A survey of tank warfare in Europe from D-Day to 12 August 1944", by H.G. Gee, May 1952 (available at the PRO as WO 291/1218), is based on 112 tank vs. tank actions fought by 21 AG. It gives the mean engagement ranges for this sample as 405 yards (standard deviation 380) in close country, and 1204 yards (standard deviation 735) in open country.

BRL Memo no. 798, "Data on World War II tank engagements involving the US Third and Fourth Armored Divisions", by D. C. Hardison, June 1954, is based on 86 tank vs. tank and tank vs. anti-tank engagements fought by the divisions mentioned. It gives the average ranges at which tanks were destroyed, in yards, as follows:

Allied tanks	Enemy tanks	Place
476	N/A	Vicinity Stollberg
959yd	733yd	Roer to Rhein
1000yd	833yd	Belgian Bulge
1260yd	936yd	Vicinity Arracourt
1116yd	831yd	Sarre
731yd	915yd	Relief of Bastogne

The overall mean casualty ranges are given as 946 yds for Allied and 893 yds for enemy tanks. The distribution of combat ranges was found to fit approximately to a Pearson III distribution.

Both the negative exponential (Shephard) and Pearson III (Hardison) distributions have long tails, meaning that there are many enegagements at short ranges and very few at very long ranges. There, are, though, rare cases of engagements at extremely long ranges.

The greatest ranges mentioned for any action in those listed by the above studies are:

Shephard: 4,800 yards (118 actions)
Gee: 3,000 yards (112 actions)
Hardison: 3,500 yards (86 actions)

"Red Army Handbook 1939-1945", by S. J. Zaloga and L. S. Ness, 1998 (Alan Sutton, Thrupp) gives on page 179 a table of the ranges in metres at which Soviet tanks and assault guns were knocked out by 75mm and 88mm guns in 1943-44, as follows:

Range	75mm gun	88mm gun
100-200	10.0%	4.0%
200-400	26.1%	14.0%
400-600	33.5%	18.0%
600-800	14.5%	31.2%
800-1000	7.0%	13.5%
1000-1200	4.5%	8.5%
1200-1400	3.6%	7.6%
1400-1600	0.4%	2.0%
1600-1800	0.4%	0.7%
1800-2000	0.0%	0.5%

The original has omitted the line for 600-800 metres, so I have calculated the entries for that line by subtracting the sum of each column from 100%.

Jane's Infantry Weapons for 1975 contains a couple of graphs showing the expected range of rifle and MG engagements, although the source is not given apart from a vague reference to "US statisticians".

For rifles,
About 30% of engagements take place at 100 metres or less
About 72% of engagements take place at 200 metres or less
About 88% of engagements take place at 300 metres or less
About 97% of engagements take place at 400 metres or less

For MGs,
About 50% of engagements take place at 750 metres or less
About 80% of engagements take place at 1200 metres or less
About 95% of engagements take place at 1600 metres or less

[6.63] Conclusion

In 1944 the average distance German anti-tank guns knocked out allied tanks was 946 yards. The average unobstructed visibility in NW Europe was about 950 yards. This seems to indicate German gunners opened fire as soon as they saw the enemy. Now of course the very experienced gunners would hold their fire until they could guarantee a hit, but I assume this type of experienced nerves of steel gunner was rare.

The Allied (US) comparision was 893 yards, which could represent better German armour or perhaps worst US optics or guns.

Russian figures from 1943-1944 show lesser ranges for the Germans, about 600 yards for the 75mm and 800 yards for the 88mm. As German guns in 1943 were, on average, lower velocity weapons, this could explain the difference. As I would expect the average unobstructed visibility in Southern Russia would be greater than the NW Europe value of 950 yards.

The final note is not all the weapons were high velocity, some would of fired lower velocity rounds, such as HEAT, which would drop the above values. I would still expect the longest practical range would be about 1.5 seconds of flight, anything greater would result in a 2nd round being required. At 1 second the accuracy would be very good, which would represent the range where minimal accuracy factors need to be considered.

[6.64] HEAT

Due to the negative effect of spin stabilisation on the HEAT round, its velocity was kept low. Typically between 350 m/s and 450 m/s, with some unusual values for the 88mm of 600 m/s. Based on this the effective range of these weapons would be 350m to 450m, before accuracy dropped, and a maximum range of 525m to 675m before accuracy got so low it was no longer an effective weapon.

The highest velocity HEAT round I could find was for the 88mmL56 fired from the Tiger I. Its velocity was 600m/s, so its effective range should have been 600m. At this range it could penetrate 90mm at 30-degrees compared to 106mm for a APCBC round, or 140mm for a APCR round. The reason why it could obtain such a high velocity could be the reason why, for a HEAT round, it was not very effective.

If we do the same comparison for a 75mmL48 we get range of 450m for the HEAT round with a penetration of 75mm (at 30-degrees), compared with 95.5mm for a APCBC round, with greater accuracy. No wonder the German tank commanders preferred the APCBC round. If we stretch this out to 1.5-second flight time giving the HEAT round a range of 675m, the APCBC round has a 90.25mm penetration at 750m, still better.

If we assume that any range the APCBC round is superior to the HEAT round we get an idea of the possible accuracy over range.

Range	APCBC 790m/s	HEAT 450m/s	APCBC Accuracy	HEAT Accuracy
100m	106mm	75mm	100%	100%
250m	100mm	75mm	100%	100%
500m	95mm	75mm	100%	100%
750m	90mm	75mm	100%	75%
1000m	85mm	75mm	75%	50%
1250m	79mm	75mm	50%	25%
1500m	74mm	75mm	50%	0%
1750m	69mm	75mm	25%	0%
2000m	64mm	75mm	25%	0%

In the above table we can see the APCBC round is always preferred, however if firing at a static target at range the HEAT would be a better option. Even with a 3second flight time with enough shots you will hit the target and the full effect of the HEAT round can come into play.

This matches the soviet testing, where a APFSDS round at 1000m had an accuracy of 75%, while a HEAT round had an accuracy of 25%. At 500m the HEAT round accuracy matched the APFSDS at 1000m. Thus, a 2 second flight drops accuracy to 25% compared with a 1 second flight time. We can assuming at 1.5 seconds we are looking at 50% accuracy. At 3 seconds the drop becomes 45m, which is almost indirect fire. We can assume 3 seconds is not feasible for direct fire, so the end point is probably 2.5 seconds. But all this is guess work which needs checking against reality and one source indicates the Germans did knock out tanks at a range of 4,800 yards at least 118 times, although this seems rather hard to believe. If it's a 75mmL70 with a velocity of 1130m/s, this represents a flight time of almost 4 seconds. This weapon has penetration values up to 3000m, so this seems a more reasonable maximum range and takes less than 3 seconds to travel.

Conclusion: I have no idea how accurate this is, but we do need to factor in accuracy somehow. By basis is that at any range the APCBC round is superior to the HEAT round for a 75mmL48.

The base point for accuracy is 1 second of flight.

At 1.5 seconds of flight accuracy drops by 25%

At 2 seconds of flight accuracy drops by 50%

At 2.5 seconds of flight accuracy drops by 75%

At 3 seconds of flight accuracy drops by 87%

At 4 seconds a flight accuracy drops by 100%, so is not possible.

One point of note is the higher the velocity, the more drop due to gravity is greater. A drop of 5m over 400m is a steeper curve than a 5m drop over 1000m.

With a velocity of 450m/s and a flight duration of 3 seconds, you need to aim 45m higher than the target to hit it. This is a triangle 1350m long and 45m high. This requires the gun to be elevated by 1.91 degrees. If we are dealing with a 1000 m/s velocity the angle drops to 0.859 degrees. This does not sound like much, but may indicate the accuracy drops with velocity over distance.

Finally, a HEAT round will only create a hole, unless it hits something critical the tank will not be knocked out. In summary, while it can penetrate the armour it may not knock the tank out. Of course the larger the HEAT shell the greater the chance of causing catastrophic damage, but compared with a AP round which can penetrate the same amount of armour, it's not as effective at knocking the tank out.

[6.7] CONCLUSION

The first conclusion is the variables are so great that as much as possible you should use real life test results. These may need to be normalised if there are any anomalous data points, but apart from that exception go with real life values.

The one effect of this is some weapons seem to have unusually good values, such as the 76.2mmL55, however there may be real life reasons for this which we cannot see when we simply look at calibre, Length and ammo types. This also applies to weapons which have an unusually poor value, such as late war German weapons and many Russian weapons.

[6.71] More than one Real Life Data point (See Case 6.81]

Once we have a number of real life data points we can attempt to fill in missing data points. Missing values between real life data points can easily be filled in. Missing Data points which extent beyond the last real life data points should follow any existing trend.

[6.72] One Data Point (See Case [6.72])

The difficult area is when we only have 1 real life data point. In this cases find the closest weapon, calibre and length, with a complete trend and use this.

If the weapon has a data point for at least one type of ammo, you can use this as your base line. Use trends and absolute difference for the closest type of weapon, using your base line.

[6.73] No Data Point

If the weapon has no data points for any type of ammunition, you need to find the closest weapon, calibre and length, and use its values.

[6.71] Ammo Type Differences Guide (at 100m)

At 100m we can ignore the effect of wind resistance and only need to consider velocity (length) and calibre when considered differences in ammo types.

We will first consider ammo types which should be the same.

Weapon	AP	APBC		
85mmL54.6	95mm	97mm	2mm	(2%)
100mmL59.6	125mm	130mm	5mm	(4%)

Conclusion: While AP & APBC should be the same we do see some minor improvement in penetration.

The difference between AP & APBC is 3% at 100m.

Weapon	APC	APCBC		
37mmL53	40mm	40mm		
45mmL45	54mm	57mm	3mm	(5%) (This is suspect)
76.2mmL55	169mm	174mm	5mm	(2%)
128mmL55	189mm	187mm	-2mm	(-1%)

Conclusion: While APC & APCBC should be the same at 100m we do see some minor improvement in penetration.

The difference between AP & APCBC is 2% at 100m.

The next group are ammo types which should show a difference in penetration.

Weapon	AP	APC		
37mmL47.8	36mm	41mm	5mm	(14%)
50mmL42	53mm	55mm	2mm	(3%)
76.2mmL55	160mm	169mm	9mm	(5%)

Conclusion: We would expect a difference in penetration at 100m.

The difference between AP & APC is 7% at 100m.

Based on the above we can make the following assumptions.

The difference between AP & APCBC is 9% at 100m. (7% + 2%)

The difference between APBC & APC is 4% at 100m. (7% - 3%)

The difference between APBC & APCBC is 6% at 100m. (7% + 2% - 3%)

Weapon	APCBC	APCR		
75mmL46	100mm	143mm	43mm	(43%)
75mmL70	138mm	194mm	56mm	(40%)
88mmL56	120mm	170mm	50mm	(41%)
88mmL70	132mm	152mm	20mm	(15%)

Conclusion: We would expect a difference in penetration at 100m.

The difference between APCBC & APCR is 40% at 100m.

Weapon	APCBC	APDS		
57mmL50	98mm	142mm	44mm	(44%)
76.2mmL55	174mm	275mm	101mm	(58%)

Conclusion: We would expect a difference in penetration at 100m.

The difference between APCBC & APDS is 50% at 100m.

Based on the above we can make the following assumptions.

The difference between APDS & APCR is 10% at 100m. (50% - 40%)

Weapon	APCBC	APCNR		
75mmL39.3	72mm	198mm	126mm	(175%)

Conclusion: We would expect a difference in penetration at 100m.

The difference between APCBC & APCNR is 175% at 100m.

The final group are the fringe cases, such as APHE. We would expect a reduced penetration, however the effect if a penetration occurs would be more significant)

Weapon	APHE	APCBC		
76.2mmL42	67mm	98mm	-31mm	(-50%)
105mmL25.8	56mm	63mm	-7mm	(-12%)

Conclusion: We would expect a difference in penetration at 100m.

The difference between APHE & APCBC is -20% at 100m.

Comparing the following Ammo penetration rates

With	APHE	AP	APBC	APC	APCBC	APCR	APDS	APCNR
APHE	-	+11%	+14%	+18%	+20%	+60%	+70%	+204%
AP	-11%	-	+3%	+7%	+9%	+49%	+59%	+184%
APBC	-14%	-3%	-	+4%	+6%	+46%	+56%	+181%
APC	-18%	-7%	-4%	-	+2%	+42%	+52%	+177%
APCBC	-20%	-9%	-6%	-2%	-	+40%	+50%	+175%
APCR	-60%	-49%	-46%	-42%	-40%	-	+10%	+135%
APDS	-70%	-59%	-56%	-52%	-50%	-10%	-	+125%
APCNR	-204%	-184%	-181%	-177%	-175%	-135%	-125%	-

Cross reference the two ammo types to arrive at a % value, this is negative if comparing the lesser with the greater and positive if comparing the greater with the lesser.

If the percentage is positive apply the percentage to the known value and add this, so with an AP value of 100mm if comparing it with APC, +7%, the result will be 107mm.

If the percentage is negative then this represent the greater value, you need to use this value to bring it down to 100%. So converting from APC to AP, which is -7%, multiply the APC value, in this case 107mm, by 107 and multiply by 100, which results in 100mm.

[6.72] Penetration Trends

Assuming penetration rates are linear, or near linear, we can extrapolate values from a single data point. (Most detailed analasis of specific weapons show a slight downward slope, but for our purposes we will assume its linear for simplicity sake)

Looking at known values we can group the trends by calibre and round type.

			(Average of specified calibre range)						
Round	**20mm**	**30mm**	**40mm**	**50mm**	**70mm**	**80mm**	**90mm**	**100mm**	**120mm+**
APHE		-5.2	-6.5		-7.9			-3.6	-5.1
AP	-6.55	-6.8	-9.4	-10.6	-8.9	-7.7		-10.2	
APBC				-10		-6.75		-8.5	-5.6
APC		-4.7	-7.5	-9	-10.7				-18.7
APCBC		-5.9	-7	-6.9	-8.2	-10.3	-8	-5.4	-9.75
APCR				-43.8	-20.8	-18.6	-22.3		
APDS				-10	-28.5				
APCNR	-17.5		-18.5		-24				

When we look at the calibre ranges we do see a small trend, as the calibre goes up the trend drop increases, however this is a small trend. Its most obvious for APC, although exists in some form for all rounds except APCR.

Round	**10mm-50mm**	**60mm-90mm**	**100mm+**	**Average of all Calibres**
APHE	-5.7	-5.7	-4.3	-5.7
AP	-8.0	-8.8	-10.25	-8.2
APC	-6.9	-10.7	-18.75	-9.3
APBC	-10.0	-6.75	-6.61	-6.8
APCBC	-5.8	-8.71	-5.96	-7.9
APCNR	-18	-24		-20
APCR	-43.8	-20.5		-23.1
APDS	-10	-28.5		-15.2

KEY: Values indicate the drop, in mm's, penetration over a 250m span, with a starting point of 100m.

AP, APHE and APC

We would expect all these rounds to have a similar wind resistance and as such a similar trend, yet this is not the case. The APHE round have a similar trend irrespective of calibre. The AP & APC trend increases with calibre, but APC does so greater. Possibly the benefits of APC decreases with round size.

APBC and APCBC

We would expect these rounds to be the same and there is some similarity. While 1 value does not agree it seems that the APBC trend remains the same irrespective of round size, or shows a slight decrease (which makes no sense) The APCBC, against except for 1 value, is the same or shows a slight increases.

For APC, the values for 20mm guns seems unusual. Its possible a number of these rounds are not APC and are in fact other types of rounds, if we drop 20mm we achieve a value similar to AP. Thus its possible to assume these three rounds have a similar trend of about -9mm per 250m.

APCNR, APCR and APDS

These round should be all different and this is the case. APCNR increases with calibre, although at a small rate so we can assume its similar. The APCR decreases, which does make sense as the density of the round is low and it has a full wind resistance cross section, so mass is important. Finally APDS increases, which does not make sense. I would expect no change.

While not exactly matching the above data set I am going with the following conclusions, listed below.

Conclusion #1: (10mm-50mm, 60mm-90mm, 100mm+)

APHE : The trend is the same irrespective of calibre (-5.7mm/250m)

AP: The trend increases as the calibre grows. (8mm/250m, 9mm/250m, 10mm/250m)

APC: The trend increases as the calibre grows. (7mm/250m, 11mm/250m, 18mm/250m)

APBC: The trend is the same irrespective of calibre. (-6.8mm/250m)

APCBC: The trend is the same irrespective of calibre. (-7.9mm/250m)

APCNR: The trend is the same irrespective of calibre. (-20mm/250m)

APCR: The trend decreases with the calibre. (-40mm/250m, -20mm/250m, -10mm/250m)

APDS: The trend is the same irrespective of calibre. (-15mm/250m)

[6.8] RESULT

After going through the above process what are the results, below we will list the values for the 75mmL48 at each stage of our calculations.

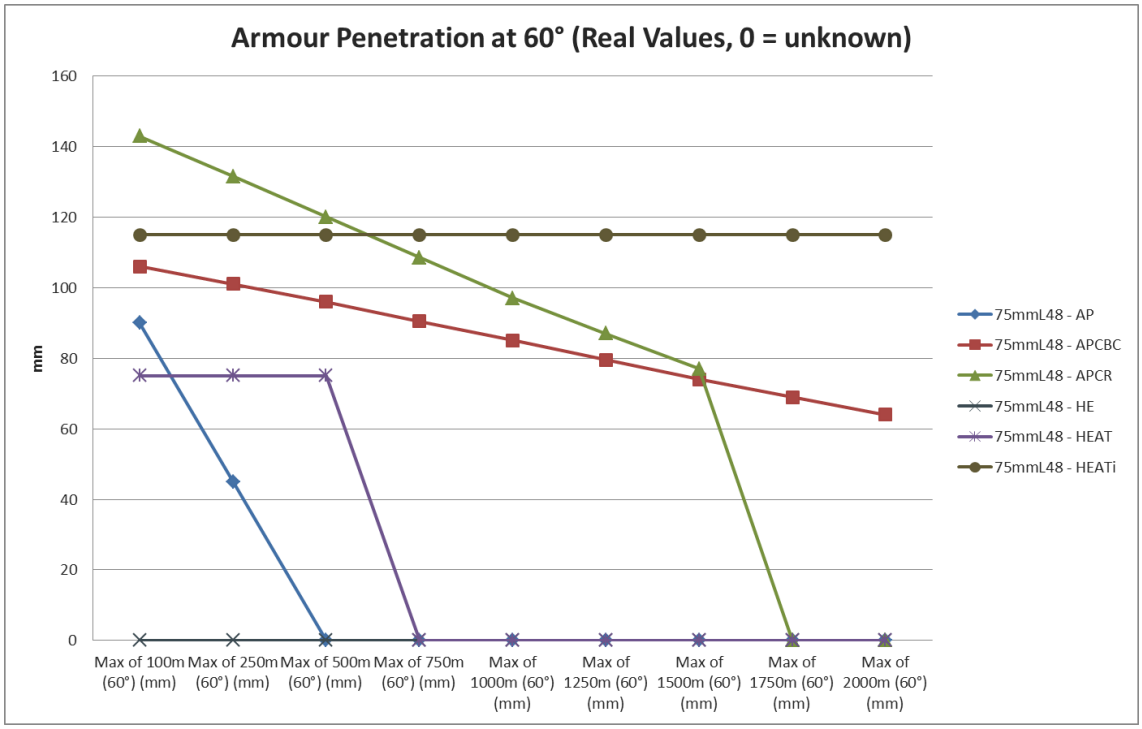


Fig [6.9a] 75mmL48 Actual test results.

Real = Values taken from published tests. Normalisation is executed between two known values. Test results are either 60-degree, 90-degree and in a few cases 45-degree. In the above example the AP, APCBC & APC results are for 60-degree results and the remainder are for 90-degree results.

We have good figures for HEAT and APCBC, but as can be seen there is a lot of missing data points for the other ammo types. Also the HEAT and APCBC use different armour angles.

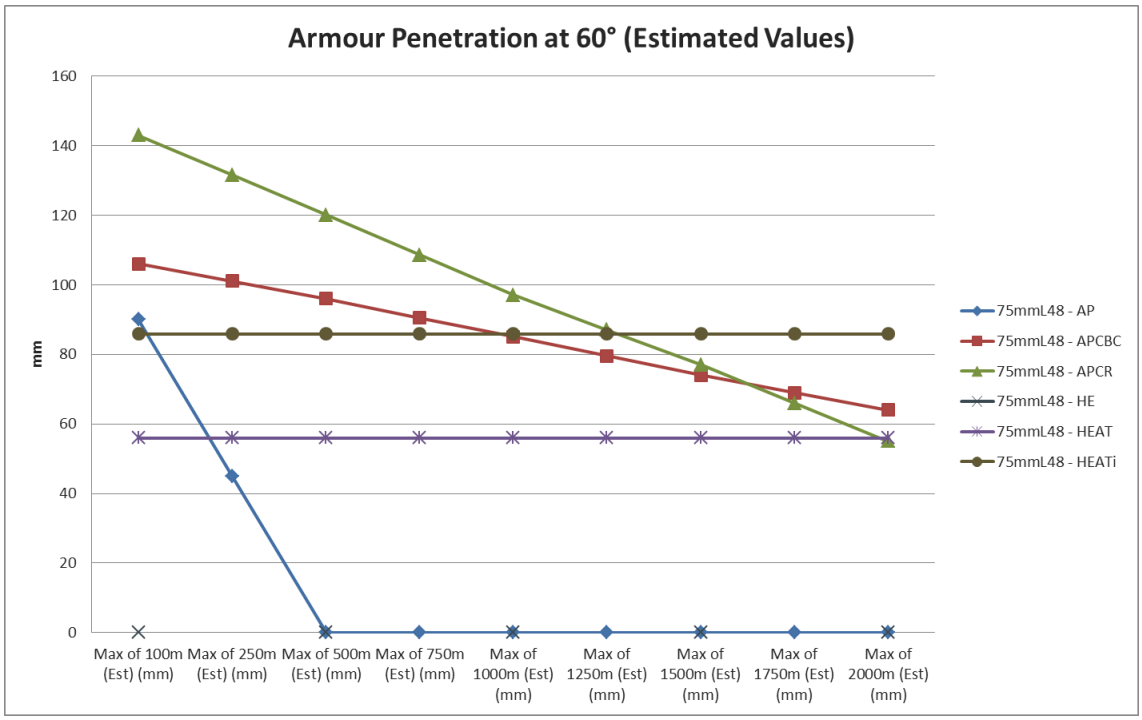


Fig [6.9b] *75mmL48 Estimated/Real Test results.*

Estimated = Values taken from published tests. Values are converted to 30-degree (60-degree) penetration values by dividing 90-degree values by 1.34. Normalisation is executed between two known values and if a trend is known upwards and downwards. In this example the AP round does not have a known trend and as a result there is only 1 known data point.

The missing data points have been filled out, based on existing trends. All values are normalised to use the same armour angle. We lack sufficient data points for the AP, but for the others we have a good view of the penetration values of the different rounds.

Based on this the gun should always use HEATi when firing at targets further than 1250m away – as this did not occur in reality we must be missing something.

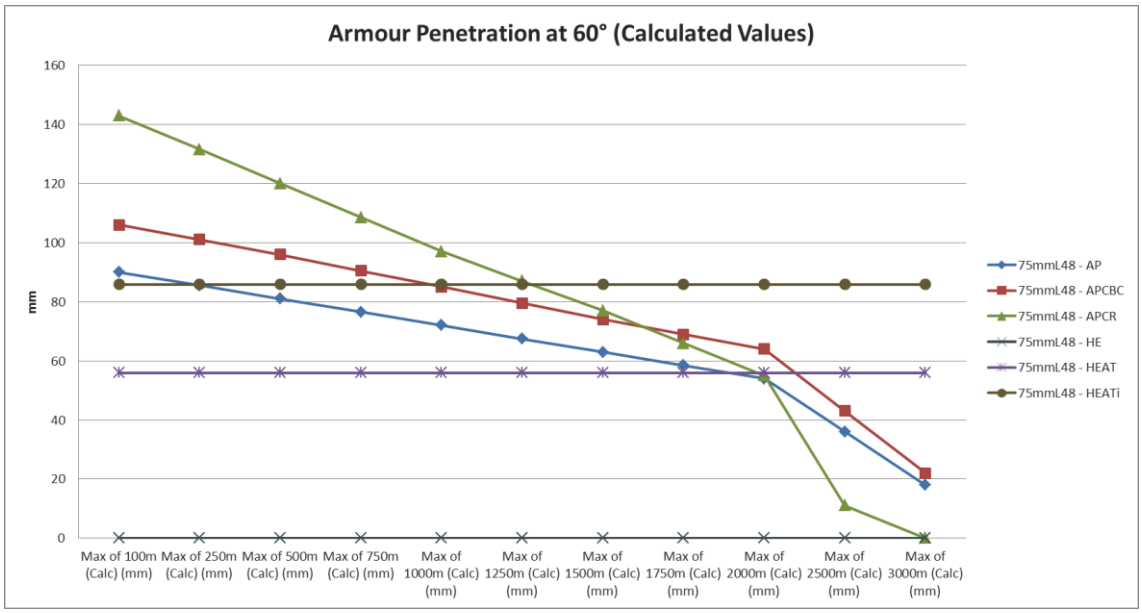


Fig [6.9c] *75mmL48 Calculated results.*

Calculated = Values taken from published tests. Values are converted to 30-degree (60-degree) penetration values by dividing 90-degree values by 1.34. Normalisation is executed between two known values and if a trend is known upwards and downwards. If a value is unknown its calculated based on other known values IN this cases the AP trend is taken from the trends of the other rounds. Values for 2500m and 3000m have been added.

We now have values for the AP round and have extrapolated out to 3000m. As with the other chart this gun should only fire HEATi beyond 1250m, which is not historically accurate

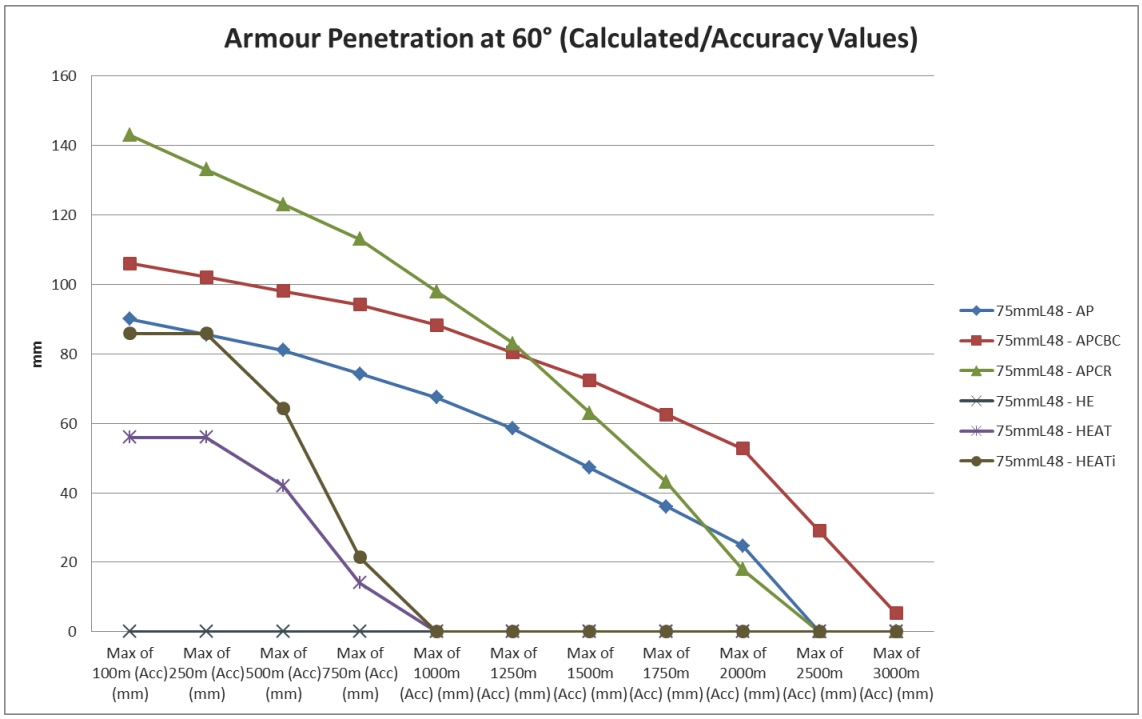


Fig [6.9d] *75mmL48 Calculated results.*

Calculated = Values taken from published tests. Values are converted to 30-degree (60-degree) penetration values by dividing 90-degree values by 1.34. Normalisation is executed between two known values and if a trend is known upwards and downwards. If a value is unknown its calculated based on other known values. An accuracy modifiers is then applies, any flight time of more than 1.5sec is reduced by 25%, 2sec by 50% and 2.5sec by 75%. Values over 2.5sec have a value of zero, except in a few cases when this is 3sec. In order to create a curve additional maths is applied.

We are now factoring in accuracy, round which take more than 1 second to hit their target have a reduction in accuracy, out to 3 seconds and accuracy is so poor its almost useless. Of course firing at a stationary target which cannot move, such as a pill box, is still viable at these longer ranges.

Based on this the best round is the APCR round, which was the case in reality. IN the original chart there are bumps in the trend is due to an accuracy modifier being applied. Accuracy should be a curve rather than this stepped effect, so additional maths has been applied to get a nice curve.

We may ask ourselves if the HEAT rounds have such a poor performance, why use them. The answer was a HEAT round was very simple and cheap to manufacture, many German tank commanders used the HEAT round instead of a HE round. I am uncertain why, but clearly the HEAT round was used against soft targets or lightly armoured targets saving the APCR or APCBC for hard targets.

[6.9] THE GAME

We now need to consider how this data will be used in the Game System, or how to convert a penetration value into a FE value in Korps Comander.

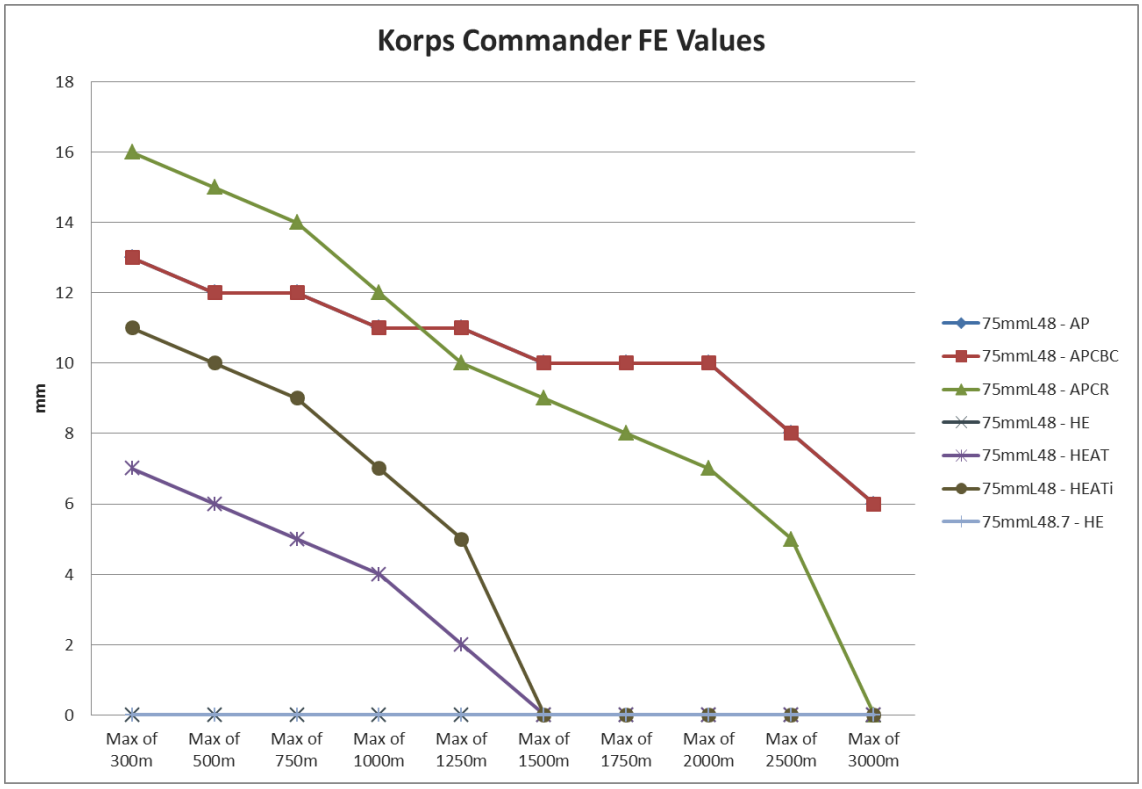


Fig [6.9a] Korps Commander FE values for 75mmL48

We can see the trend lines do not match real life values or calculated accuracy modified values, although we do see a rapid drop with range which would reflect some form of accuracy modification. What we see is a vague similarity to the real life chart, once accuracy is factored in.

The ratio between FE values and penetration values is hard to pin down, If we look at some examples based on the above chart;

	APCDS		APCR	
	FE(KK)	(mm pen)	FE(KK)	(mm pen)
250m	13	102mm	16	133mm
500m	12	98mm	15	123mm
750m	12	94mm	14	113mm
1000m	11	88mm	12	98mm
1250m	11	80mm	10	83mm
1500m	10	72mm	9	63mm
1750m	10	62mm	8	43mm
2000m	10	52mm	7	18mm
2500m	8	40mm	5	-
3000m	6	29mm	-	-

There seems to be no ratio between penetration and FE values and they seem to range from 8mm per 1 FE to 1mm per FE. The higher ratios are at lower ranges.

If we pick a simple ratio of 5mm = 1 FE we will end up with higher values at low range and with a rapid drop off as the range increases. I tend to believe this may be a more historical result, as it would force engagements to shorter range which would be historical.

My theory why this occurs is due to the way the FE values were created. I feel Bruce used Firefly values in Korps Commander. Now firefly, being a 1 vehicle = 1 base scale game could use raw penetration values and an accuracy or range modifier. This allows it to knock vehicles out at long ranges, which was possible in exceptional circumstances. However in a 1 company = 1 base scale game these fringe results need to be removed for playability reasons.

The other reason could also be to deal with HEAT, in the above chart I have reduced the effect of HEAT over distance, but in the original game HEAT retained its penetration for its entire range. If we do this HEAT quickly becomes the ammo of choice, which was not historical. By keeping the values of AP, APC, APCBC, APCR and APDS high over distance this issue is removed.

My two theories are only guesses, but in the end its all about game systems and playability. I feel using more historical values will work better in a game system which uses 1 company = 1 base scale. This makes it more bloody at close range and less at longer range.

[7.0] FIRE COMBAT (DE)

The other side to fire combat is defensive effectiveness and how Bruce determined the DE of his bases. Assuming he based it on Firefly the first observation is there seems to be a ratio of 10mm of frontal armour for each DE point. So a Polish 10TP has 20mm of frontal armour and a FF frontal defence value of 2 and the panther with frontal turret armour of 100mm and frontal hull armour of 80mm with a DE of 10. The Panther D, with slightly less turret armour, has a DE of 9. The same applies with side armour.

This algorithm is a reasonable one, yet my question is if the ratio for armour was 10:1, why is the ratio for gun penetration range from 8:1 to 1:1. I think the low ratio of 1:1 is due to the desire to have long range combat in firefly scale games, but the 8:1 makes no sense. The basic ratio for both armour and armour penetration should be the same, unless there was a game mechanic issue.

At tactical level games there is a perceived issue with super-tanks, vehicles with so much armour there is no way to stop them. In reality even a super tank could be immobilised by a lucky shot to the tracks, as occurred with the Elefant the US army captured in Italy which was displayed in the Aberdeen proving grounds. If you allowed this type of shot in a game-system, then a lucky spin of a dice could dramatically alter a game and players may perceive this as unfair. Imagine a player who expends all his points on 5 elephants, only to find a piddly 57mm ATG immobilise 20% of his force with a lucky die roll. Also imagine the opposing player using his points to purchase a horde of Stuart Tanks, hoping with enough die rolls he will be able to immobilise the enemies elephants before they destroy his horde. At a higher scale, like Korps Commander, and using historical army lists based on periods, or historical scenarios, this “problem” does not occur, or is at least minimal.

If we use 10:1 for armour defence then no change is required, but if we apply this to gun penetration rates we end up with weapons with much lower effective ranges, typically by 25m. Assuming a 5mm penetration rate becomes a 0, which is possible in Korps Commander, a 75mmL31 firing APCBC has an effective maximum range of 1750m with a FE of 1. A 75mmL37.5 firing APCBC has a maximum effective range of 2000m with a FE of 0. This could be reasonable so I will now go back and adopt this ratio.

I am uncertain how he takes into account sloped armour but as my gun penetration rates assume all armour is sloped by 30-degree’s if we apply the 10:1 ratio we are assuming all armour is sloped. This gives armour a slight benefit beyond what the raw figures would indicate.

The final area to take into account is side and rear armour. While there is a modifier when firing into the flank and rear of an armoured base, it does not have a large effect. Considering the Panther has 40mm on its sides, compared with 80mm on its front (hull), you would expect a larger effect.

Considering the scale of this game system, if fired upon a flank or rear your vehicles would quickly turn around to face the enemy, so over a 60minute period the effect is probably not as significant as we would initially feel. To factor in vehicles with unusually good all-round armour, or unusually poor side armour, you would need to create an algorithm to reflect this in a single DE value.

PART 11: REFERENCE CHARTS

[15.0] ARMOUR PENETRATION TABLES

These armour penetration table is based on the calculations as described in this Players Notes. No modification for accuracy is included and all values are in mm of Armour penetrated. Armour is at 30-degress from horizontal, or 60-degree from vertical. Values are all based on commonly available published material and readers should be aware that testing often used different, incompatible, testing processes.

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
US	.30 in Browning machine gun	7.62mmMG	AP	AP and AP/T	853	8	6	4	2	0	0	0	0	0	0
US	M1918 Browning Automatic Rifle	7.62mmLMG	AP	-	823	8	6	4	2	0	0	0	0	0	0
US	.50 cal M2 Browning machine gun	12.7mmHMG	AP	AP/T	884	12	12	11	11	10	10	9	9	8	6
US	.50 cal M2 Browning machine gun (x2)	2x12.7mmHMG	AP	AP/T	884	12	12	11	11	10	10	9	9	8	6
US	.50 cal M2 Browning machine gun (x4)	4x12.7mmHMG	AP	AP/T	884	12	12	11	11	10	10	9	9	8	6
US	37 mm M5 Gun	37mmL53	APCBC	APC M51 B1/B2	792	59	56	53	50	46	43	40	38	35	23
US	37 mm M5 Gun	37mmL53	AP	AP M74	625	37	32	27	23	19	14	9	5	0	0
US	37 mm Automatic Gun M1	37mmL54	APC	APC-T M59A1	792	26	25	23	21	18	17	15	14	13	6
US	37 mm M3A1 Gun L/56.6	37mmL56.6	APCNR	APSV-43	792	72	62	52	42	32	22	12	6	0	0
US	37 mm M6 Gun	37mmL56.6	APCBC	APC M51 B1/B2	792	59	56	53	50	46	43	40	38	35	23
US	37 mm M6 Gun	37mmL56.6	AP	AP M74	881	46	41	36	31	26	21	16	11	6	0
US	40 mm Automatic Gun M1	40mmL56	AP	AP M81A1	881	55	51	47	42	37	32	27	22	18	0
US	40 mm Automatic Gun M1	40mmL56	HEAT	-	881	37	37	37	37	37	37	37	37	37	37
US	40 mm Automatic Gun M1 (x2)	2x40mmL56	AP	AP M81A1	881	55	51	47	42	37	32	27	22	18	0
US	40 mm Automatic Gun M1 (x2)	2x40mmL56	HEAT	-	881	37	37	37	37	37	37	37	37	37	37
US	57 mm M18	57mmRCL	HEAT	T20E2 / M307	365	47	47	47	47	47	47	47	47	47	47
US	57 mm gun M1 L/43	57mmL43	APCBC	APC M86	884	96	87	79	71	63	56	49	46	43	8
US	57 mm gun M1 L/43	57mmL43	APC	M70	820	82	78	73	69	66	63	61	60	59	43
US	57 mm gun M1/M2	57mmL50	APCBC	APC M86	884	98	96	93	90	86	83	80	77	74	62
US	57 mm gun M1/M2	57mmL50	APC	M70	820	82	78	73	69	66	63	61	60	59	43
US	M1 Rocket Launcher	57mmATRLM1	HEAT	-	-	89	89	89	89	89	89	89	89	89	89
US	M9 Rocket Launcher	57mmATRLM9	HEAT	-	-	89	89	89	89	89	89	89	89	89	89
US	75 mm M20	75mmRCL	HEAT		300	75	75	75	75	75	75	75	75	75	75
US	75mm M7 AT Mine	75mmATGr	HEAT	-	-	22	22	22	22	22	22	22	22	22	22
US	75 mm P.How M1A1	75mmL15.9	HEAT	HEAT M66	381	68	68	68	68	68	68	68	68	68	68
US	75 mm M2/M3 How	75mmL15.9	HEAT	HEAT M66	381	68	68	68	68	68	68	68	68	68	68
US	75 mm M2 Gun	75mmL31	APCBC	APCBC M61	588	65	62	60	58	55	53	51	49	46	37
US	75 mm M2 Gun	75mmL31	APC	APC M61	588	67	64	60	57	53	50	46	42	38	23
US	75 mm M2 Gun	75mmL31	AP	AP M72	380	67	64	60	57	53	50	46	42	38	23
US	75 mm M1897 M4	75mmL34	AP		596	67	64	60	57	53	50	46	42	38	23
US	75 mm M3 Gun	75mmL37.5	APCBC	APCBC M61	619	71	69	66	63	60	58	55	53	50	39
US	75 mm M3 Gun	75mmL37.5	APC	APC M61	619	87	82	76	70	63	57	51	47	43	21
US	75 mm M3 Gun	75mmL37.5	AP	AP M72	380	87	82	76	70	63	57	51	47	43	21
US	75 mm M6 Gun	75mmL39	APCBC	APC M61	619	71	69	66	63	60	58	55	53	50	39
US	75 mm M6 Gun	75mmL39	AP	AP M72	380	87	82	76	70	63	57	51	47	43	21
US	76.2 mm M1A1 Gun	76mmL52	APCR	HVAP M93	792	177	167	157	146	135	126	116	107	98	59
US	76.2 mm M1A1 Gun	76mmL52	APCBC	APC M62	792	99	96	93	91	88	85	82	79	75	63
US	76.2 mm M1A1 Gun	76mmL52	AP	AP M79	853	124	117	109	101	92	84	76	70	64	34
US	76.2 mm M1A2 Gun	76mmL52	APCR	HVAP M93	792	177	167	157	146	135	126	116	107	98	59
US	76.2 mm M1A2 Gun	76mmL52	APCBC	APC M62	792	99	96	93	91	88	85	82	79	75	63
US	76.2 mm M1A2 Gun	76mmL52	AP	AP M79	853	124	117	109	101	92	84	76	70	64	34

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
US	3 inch M5 Gun	76mmL53	APCR	HVAP M93	792	177	167	157	146	135	126	116	107	98	59
US	3 inch M5 Gun	76mmL53	APCBC	APC M62	792	99	96	93	91	88	85	82	79	75	63
US	3 inch M5 Gun	76mmL53	AP	AP M79	853	124	117	109	101	92	84	76	70	64	34
US	3 inch M7 Gun	76mmL53	APCR	HVAP M93	792	177	167	157	146	135	126	116	107	98	59
US	3 inch M7 Gun	76mmL53	APCBC	APC M62	792	99	96	93	91	88	85	82	79	75	63
US	3 inch M7 Gun	76mmL53	AP	AP M79	853	124	117	109	101	92	84	76	70	64	34
US	76.2 mm M1 Gun	76mmL57	APCR	HVAP M93	792	177	167	157	146	135	126	116	107	98	59
US	76.2 mm M1 Gun	76mmL57	APCBC	APC M62	792	99	96	93	91	88	85	82	79	75	63
US	76.2 mm M1 Gun	76mmL57	APC	-	792	124	117	109	101	92	84	76	70	64	34
US	76.2 mm M1 Gun	76mmL57	AP	AP M79	853	124	117	109	101	92	84	76	70	64	34
US	90 mm M1A2 Gun	90mmL52.4	APCBC	APC M82	830	128	124	120	116	112	108	104	100	96	80
US	90 mm M1A2 Gun	90mmL52.4	APC	AP T33	830	160	150	140	130	120	110	100	90	80	40
US	90 mm M1A2 Gun	90mmL52.4	AP	AP T33	732	160	150	140	130	120	110	100	90	80	40
US	90 mm M2 Gun	90mmL53	APCR	HVAP M304	808	243	232	221	210	199	188	176	166	156	113
US	90 mm M2 Gun	90mmL53	APCBC	APC M82	830	128	124	120	116	112	108	104	100	96	80
US	90 mm M2 Gun	90mmL53	APC	AP T33	830	160	150	140	130	120	110	100	90	80	40
US	90 mm M2 Gun	90mmL53	AP	AP T33	732	160	150	140	130	120	110	100	90	80	40
US	90 mm M3 Gun	90mmL53	APCR	HVAP M304 (T30E16)	808	243	232	221	210	199	188	176	166	156	113
US	90 mm M3 Gun	90mmL53	APCBC	APC M82	830	128	124	120	116	112	108	104	100	96	80
US	90 mm M3 Gun	90mmL53	APC	AP T33	830	160	150	140	130	120	110	100	90	80	40
US	90 mm M3 Gun	90mmL53	AP	AP T33	732	160	150	140	130	120	110	100	90	80	40
US	90 mm T15E2 Gun	90mmL55.8	APCR	HVAP T44	808	268	256	244	233	221	209	196	185	173	126
US	90 mm T15E2 Gun	90mmL55.8	APCBC	APC M82	830	128	124	120	116	112	108	104	100	96	80
US	90 mm T15E2 Gun	90mmL55.8	AP	AP T33	732	160	150	140	130	120	110	100	90	80	40
US	100 mm M9 AT Grenade	100mmATGr	HEAT	-	311	75	75	75	75	75	75	75	75	75	75
US	105 mm How M3	105mmL18	HEAT	HEAT M67	311	76	76	76	76	76	76	76	76	76	76
US	105 mm M2A1 How	105mmL22	HEAT	HEAT M67	472	76	76	76	76	76	76	76	76	76	76
US	105 mm M4 How (M2A1)	105mmL22	HEAT	HEAT M67	472	76	76	76	76	76	76	76	76	76	76
UK	.303 in Bren gun	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
UK	.303 in Vickers machine gun	7.92mmMG	AP	-	744	8	6	4	2	0	0	0	0	0	0
UK	Bren Light Machine Gun	7.92mmLMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
UK	.303 in Vickers machine gun (x2)	2x7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
UK	.303 in Vickers machine gun (x4)	4x7.92mmMG	AP	-	365	8	6	4	2	0	0	0	0	0	0
UK	.50 cal M2 Browning machine gun	12.7mmHMG	AP	AP W.Mk.I	785	11	10	9	8	7	6	5	4	3	0
UK	.5 inch Vickers machine gun	12.7mmHMG	AP	AP W.Mk.I	785	11	10	9	8	7	6	5	4	3	0
UK	.5 inch Vickers machine gun (x2)	2x12.7mmHMG	AP	AP W.Mk.I	785	11	10	9	8	7	6	5	4	3	0
UK	.5 inch Vickers machine gun (x4)	4x12.7mmHMG	AP	AP W.Mk.I	884	11	10	9	8	7	6	5	4	3	0
UK	0.55 in Boys anti-tank rifle	14.3mmATR	AP	-	890	23	21	19	17	15	13	11	9	7	0
UK	15 mm Besa machine gun	15mmHMG	AP	AP W.Mk.Iz	890	16	16	15	15	14	14	13	13	12	10
UK	15 mm Besa machine gun (x2)	2x15mmHMG	AP	AP W.Mk.Iz	840	16	16	15	15	14	14	13	13	12	10
UK	20 mm 20/65 Breda 35	20mmL65	AP		820	27	23	19	15	11	7	3	1	0	0
UK	Oerlikon 20 mm cannon	20mmL70	AP	20×110mm RB	830	46	42	38	34	30	26	22	18	14	0
UK	20 mm Polsten Cannon	20mmL72	AP	-	820	30	26	22	18	14	10	6	3	0	0
UK	Oerlikon 20 mm cannon (x2)	2x20mmL70	AP	20×110mm RB	830	46	44	42	40	38	36	34	32	30	22
UK	20 mm Polsten Cannon (x2)	2x20mmL72	AP		830	30	28	26	24	22	20	18	16	14	6
UK	20 mm Polsten Cannon (x4)	4x20mmL72	AP		950	30	20	10	5	0	0	0	0	0	0
UK	25 mm A/T gun SA 35	25mmL60	AP	AP 34 BP (c/f)	-	35	33	30	25	20	16	13	9	5	0
UK	37 mm OQF Mk 1	37mmL45	AP	-	870	40	37	33	27	20	18	15	11	7	0
UK	37 mm OQF Mk 1	37mmL45	APHE	-	-	35	32	29	26	22	21	20	18	15	5
UK	37 mm M5 Gun	37mmL53	APCBC	APC M51 B1/B2	792	59	56	53	50	46	43	40	38	35	23
UK	37 mm M5 Gun	37mmL53	AP	AP M74	1143	37	32	27	23	19	14	9	5	0	0
UK	37 mm M5 Gun	37mmL53	APCNR	APSV-43	884	72	62	52	42	32	22	12	6	0	0
UK	37 mm M6 Gun	37mmL56.6	APCBC	-	792	59	56	53	50	46	43	40	38	35	23
UK	37 mm M6 Gun	37mmL56.6	AP	-	792	46	41	36	31	26	21	16	11	6	0
UK	2 pounder gun	40mmL50	APCBC	APCBC, Mk.1T	792	65	61	58	54	50	46	42	38	34	18
UK	2 pounder gun	40mmL50	APC	-	792	55	51	47	42	37	32	27	22	18	0

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
UK	2 pounder gun	40mmL50	AP	AP, Mk.1T	1280	49	43	37	32	27	22	17	12	6	0
UK	2 pounder gun	40mmL50	APCNR	AP/CNR, Mk.1	900	77	67	57	47	37	27	17	8	0	0
UK	40 mm Bofors gun	40mmL60	APC	-	900	60	56	51	48	45	42	38	35	32	18
UK	40 mm Bofors gun	40mmL60	AP		900	55	51	47	42	37	32	27	22	18	0
UK	40 mm Bofors gun	40mmL60	APHE	40 × 311R	881	20	17	14	12	9	6	3	2	0	0
UK	Cannone da 47/32-34 M35	47mmL34	AP	-	250	58	51	43	38	32	26	19	13	6	0
UK	Cannone da 47/32-34 M35	47mmL34	HEAT	-	-	35	35	35	35	35	35	35	35	35	35
UK	QF 3 pounder Hotchkiss	47mmL40	APHE	47×360mmR 3.3	785	55	51	48	45	41	38	35	32	29	16
UK	6 pounder gun Mk II	57mmL43	APDS	APDS, Mk 1T	792	130	124	117	110	103	100	97	93	90	70
UK	6 pounder gun Mk II	57mmL43	APCBC	APCBC, Mk 9T	846	84	79	75	71	67	65	63	61	60	44
UK	6 pounder gun Mk II	57mmL43	APC	APC, Mk 8T	820	69	65	62	58	54	50	47	43	39	19
UK	6 pounder gun Mk III	57mmL43	APDS	APDS, Mk 1T	792	130	124	117	110	103	100	97	93	90	70
UK	6 pounder gun Mk III	57mmL43	APCBC	APCBC, Mk 9T	846	84	79	75	71	67	65	63	61	60	44
UK	6 pounder gun Mk III	57mmL43	APC	APC, Mk 8T	820	69	65	62	58	54	50	47	43	39	19
UK	6 pounder gun Mk V	57mmL50	APDS	APDS, Mk 1T	831	142	136	129	122	115	112	109	105	102	82
UK	6 pounder gun Mk V	57mmL50	APCBC	APCBC, Mk 9T	884	94	89	84	79	75	73	70	69	67	49
UK	6 pounder gun Mk V	57mmL50	APC	APC, Mk 8T	820	75	72	68	63	59	55	51	47	43	21
UK	75 mm PH (uk)	75mmL15.9	HEAT	-	381	68	68	68	68	68	68	68	68	68	68
UK	75 mm M2 Gun	75mmL31	APCBC	APC M61	588	65	62	60	58	55	53	51	49	46	37
UK	75 mm M2 Gun	75mmL31	APC	-	588	67	64	60	57	53	50	46	42	38	23
UK	75 mm M2 Gun	75mmL31	AP	AP M72	380	67	64	60	57	53	50	46	42	38	23
UK	QF 75 mm Mk I	75mmL36.5	APCBC	APC M61	630	73	71	68	65	62	60	57	55	52	41
UK	QF 75 mm Mk I	75mmL36.5	APC	-	618	65	62	60	58	55	53	51	49	46	37
UK	QF 75 mm Mk III	75mmL36.5	APCBC	APC M61	630	73	71	68	65	62	60	57	55	52	41
UK	QF 75 mm Mk III	75mmL36.5	APC	-	618	65	62	60	58	55	53	51	49	46	37
UK	QF 75 mm Mk V	75mmL36.5	APCBC	APC M61	630	73	71	68	65	62	60	57	55	52	41
UK	QF 75 mm Mk V	75mmL36.5	APC	-	618	65	62	60	58	55	53	51	49	46	37
UK	75 mm M3 Gun	75mmL37.5	APCBC	APC M61	619	71	69	66	63	60	58	55	53	50	39
UK	75 mm M3 Gun	75mmL37.5	APC	-	380	87	82	76	70	63	57	51	47	43	21
UK	75 mm M6 Gun	75mmL39	APCBC	APC M61	619	71	69	66	63	60	58	55	53	50	39
UK	75 mm M6 Gun	75mmL39	AP	AP M72	380	87	82	76	70	63	57	51	47	43	21
UK	3 inch M7 Gun	76mmL53	APCR	HVAP M93	792	177	167	157	146	135	126	116	107	98	59
UK	3 inch M7 Gun	76mmL53	APCBC	APC M62	792	99	96	93	91	88	85	82	79	75	63
UK	3 inch M7 Gun	76mmL53	AP	AP M79	792	124	117	109	101	92	84	76	70	64	34
UK	3 inch M7 Gun	76mmL53	APHE	-	853	124	117	109	101	92	84	76	70	64	34
UK	76.2 mm M1 Gun	76mmL57	APCR	HVAP M93	792	177	167	157	146	135	126	116	107	98	59
UK	76.2 mm M1 Gun	76mmL57	APCBC	APC M62	853	99	96	93	91	88	85	82	79	75	63
UK	QF 17 pounder Mk I	76.2mmL55	APDS	SVDS, Mk.1T	884	205	198	191	182	174	166	159	152	145	104
UK	QF 17 pounder Mk I	76.2mmL55	APCBC	APCBC, Mk.8T	884	140	135	131	125	120	115	110	106	101	76
UK	QF 17 pounder Mk I	76.2mmL55	APC	APC, Mk.4T	884	149	140	131	120	110	101	93	85	78	31
UK	QF 17 pounder Mk I	76.2mmL55	AP	AP, Mk.3T	880	122	115	107	99	90	84	77	71	65	26
UK	QF 17 pounder Mk II	76.2mmL55	APDS	SVDS, Mk.1T	884	205	198	191	182	174	166	159	152	145	104
UK	QF 17 pounder Mk II	76.2mmL55	APCBC	APCBC, Mk.8T	884	140	135	131	125	120	115	110	106	101	76
UK	QF 17 pounder Mk II	76.2mmL55	APC	APC, Mk.4T	884	149	140	131	120	110	101	93	85	78	31
UK	QF 17 pounder Mk II	76.2mmL55	AP	AP, Mk.3T	880	122	115	107	99	90	84	77	71	65	26
UK	QF 77 mmHV	77mmL49	APDS	SVDS, Mk.1T	792	161	154	146	139	131	124	116	109	101	71
UK	QF 77 mmHV	77mmL49	APCBC	APCBC, Mk.8T	790	110	106	102	98	94	90	87	83	79	59
UK	83 mm PIAT	83mmATRL	HEAT	-	492	75	75	75	75	75	75	75	75	75	75
UK	QF 25 pounder Mk I	88mmL28	AP	AP, Mk.1T-6T/8T	532	70	66	62	59	55	52	49	46	42	28
UK	QF 25 pounder Mk II	88mmL28	AP	AP, Mk.1T-6T/8T	532	70	66	62	59	55	52	49	46	42	28
UK	QF 3.7-inch Mtn Gun	94mmL13	HEAT	-	294	47	47	47	47	47	47	47	47	47	47
UK	QF 95 mm Mk I Tank How	95mmL21	HEAT	H.E./A.T.	330	82	82	82	82	82	82	82	82	82	82
UK	QF 95 mm Mk II Inf How	95mmL21	HEAT	H.E./A.T.	330	82	82	82	82	82	82	82	82	82	82
UK	100 mm No. 68 AT Grenade	100mmATGr	HEAT	-	381	66	66	66	66	66	66	66	66	66	66
UK	105 mm M2A1 How	105mmL22	HEAT	HEAT M67	472	76	76	76	76	76	76	76	76	76	76
UK	105 mm M4 How (M2A1)	105mmL22	HEAT	HEAT M67	472	76	76	76	76	76	76	76	76	76	76

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
UK	290 mm petard mortar	290mmM	HEAT			7	7	7	7	7	7	7	7	7	7
CAN	.303 in Vickers machine gun	7.92mmMG	AP	-	744	8	6	4	2	0	0	0	0	0	0
CAN	Bren Light Machine Gun	7.92mmLMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
CAN	.5 inch Vickers machine gun	12.7mmHMG	AP	AP W.Mk.I	884	11	10	9	8	7	6	5	4	3	0
CAN	0.55 in Boys anti-tank rifle	14.3mmATR	AP	-	830	23	21	19	17	15	13	11	9	7	0
CAN	20 mm Polsten Cannon (x4)	4x20mmL72	AP	-	884	36	34	32	30	28	26	24	22	20	12
CAN	37 mm M5 Gun	37mmL53	APCBC	-	792	59	56	53	50	46	43	40	38	35	23
CAN	37 mm M5 Gun	37mmL53	AP	-	1143	37	32	27	23	19	14	9	5	0	0
CAN	37 mm M5 Gun	37mmL53	APCNR	APSV-43	792	72	62	52	42	32	22	12	6	0	0
CAN	2 pounder gun	40mmL50	APCBC	APCBC, Mk.1T	792	65	61	58	54	50	46	42	38	34	18
CAN	2 pounder gun	40mmL50	APC	-	792	55	51	47	42	37	32	27	22	18	0
CAN	2 pounder gun	40mmL50	AP	AP, Mk.1T	1280	49	43	37	32	27	22	17	12	6	0
CAN	2 pounder gun	40mmL50	APCNR	AP/CNR, Mk.1	-	139	129	119	109	99	89	79	69	59	19
CAN	6 pounder gun Mk III	57mmL43	APDS	APDS, Mk 1T	792	130	124	117	110	103	100	97	93	90	70
CAN	6 pounder gun Mk III	57mmL43	APCBC	APCBC, Mk 9T	846	84	79	75	71	67	65	63	61	60	44
CAN	6 pounder gun Mk III	57mmL43	APC	APC, Mk 8T	820	69	65	62	58	54	50	47	43	39	19
CAN	75 mm M2 Gun	75mmL31	APCBC	-	588	65	62	60	58	55	53	51	49	46	37
CAN	75 mm M2 Gun	75mmL31	APC	-	588	67	64	60	57	53	50	46	42	38	23
CAN	75 mm M2 Gun	75mmL31	AP	-	380	67	64	60	57	53	50	46	42	38	23
CAN	75 mm M3 Gun	75mmL37.5	APCBC	-	619	71	69	66	63	60	58	55	53	50	39
CAN	75 mm M3 Gun	75mmL37.5	APC	-	380	87	82	76	70	63	57	51	47	43	21
CAN	83 mm PIAT	83mmATRL	HEAT	-	472	75	75	75	75	75	75	75	75	75	75
CAN	QF 25 pounder Mk II	88mmL28	AP	AP, Mk.1T-6T/8T	532	70	66	62	59	55	52	49	46	42	28
CAN	100 mm No. 68 AT Grenade	100mmATGr	HEAT	-	-	66	66	66	66	66	66	66	66	66	66
IND	.303 in Bren gun	7.92mmMG	AP	-	744	8	6	4	2	0	0	0	0	0	0
IND	Bren Light Machine Gun	7.92mmLMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
IND	.5 inch Vickers machine gun	12.7mmHMG	AP	AP W.Mk.I	884	11	10	9	8	7	6	5	4	3	0
IND	0.55 in Boys anti-tank rifle	14.3mmATR	AP	-	-	23	21	19	17	15	13	11	9	7	0
IND	6 pounder gun Mk III	57mmL43	APDS	APDS, Mk 1T	792	130	124	117	110	103	100	97	93	90	70
IND	6 pounder gun Mk III	57mmL43	APCBC	APCBC, Mk 9T	846	84	79	75	71	67	65	63	61	60	44
IND	6 pounder gun Mk III	57mmL43	APC	APC, Mk 8T	820	69	65	62	58	54	50	47	43	39	19
IND	83 mm PIAT	83mmATRL	HEAT	-	10	75	75	75	75	75	75	75	75	75	75
IND	100 mm No. 68 AT Grenade	100mmATGr	HEAT	-		66	66	66	66	66	66	66	66	66	66
FR	Mitrailleuse de 7,5 mm MAC mle.31	7.5mmMG	AP	AP 29	850	16	11	7	5	2	1	0	0	0	0
FR	Fusil-mitrailleur M24/M29	7.5mmLMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
FR	8 mm Hotchkiss machine gun	8mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
FR	8 mm Hotchkiss machine gun (x2)	2x8mmMG	AP	-	800	8	6	4	2	0	0	0	0	0	0
FR	13.2 mm Hotchkiss HMG	13.2mmHMG	AP	AP 35	800	17	14	10	6	2	1	0	0	0	0
FR	13.2 mm Hotchkiss machine gun	13.2mmHMG	AP	AP 35	820	17	14	10	6	2	1	0	0	0	0
FR	Oerlikon 20 mm cannon	20mmL70	AP	-	950	46	42	38	34	30	26	22	18	14	0
FR	25 mm M38/39	25mmL60	APCBC	AP 39P BP (c/f)	950	35	33	30	25	20	16	13	9	5	0
FR	25 mm M38/39	25mmL60	AP	AP 34 BP (c/f)	-	35	33	30	25	20	16	13	9	5	0
FR	25 mm A/T gun SA 35	25mmL60	APCBC	AP 39P BP (c/f)	950	35	33	30	25	20	16	13	9	5	0
FR	25 mm A/T gun SA 35	25mmL60	AP	AP 34 BP (c/f)	-	35	33	30	25	20	16	13	9	5	0
FR	25 mm A/T gun SA 34	25mmL72	APCBC	AP 39P BP (c/f)	950	35	33	30	25	20	16	13	9	5	0
FR	25 mm A/T gun SA 34	25mmL72	AP	AP 34 BP (c/f)	-	35	33	30	25	20	16	13	9	5	0
FR	25 mm A/T gun SA 37	25mmL72	APCBC	AP 39P BP (c/f)	950	35	33	30	25	20	16	13	9	5	0
FR	25 mm A/T gun SA 37	25mmL72	AP	AP 34 BP (c/f)	-	35	33	30	25	20	16	13	9	5	0
FR	37 mm Puteaux SA 18	37mmL21	APC	APC 35	600	26	22	18	14	10	6	2	1	0	0
FR	37 mm Puteaux SA 18	37mmL21	AP	ODR mle.37	388	28	25	21	18	14	11	7	4	0	0
FR	37 mm Puteaux SA 18	37mmL21	APHE	ODR mle.92/24	367	12	10	8	6	4	2	0	0	0	0
FR	37 mm TRP M16	37mmL22	AP	APHE 92 mle 24	388	9	5	1	0	0	0	0	0	0	0
FR	37 mm Puteaux SA 38	37mmL33	APC	ODR mle.38	705	29	26	23	20	16	14	12	9	6	0
FR	37 mm Puteaux SA 38	37mmL33	AP	AP ODR mle 36	600	37	33	29	25	21	17	13	9	5	0
FR	37 mm Schneider M30	37mmL45	AP			35	32	29	26	22	21	20	18	15	5
FR	canon de 47 mm SA 34	47mmL30	AP	-		39	36	33	30	26	23	20	17	14	1

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
FR	canon de 47 mm SA 35	47mmL32	APC	ODR mle.35	660	39	36	33	30	26	23	20	17	14	1
FR	canon de 47 mm SA 35	47mmL32	AP	ODR mle.35	590	30	26	22	18	14	10	6	3	0	0
FR	canon de 47 mm SA 37	47mmL45	APCBC	ODR mle.36	855	57	53	49	46	42	39	36	33	29	15
FR	canon de 47 mm SA 37	47mmL45	APC	ODR mle.35	855	71	67	64	60	57	53	50	46	43	29
FR	canon de 47 mm SA 37	47mmL45	AP	-	590	52	48	44	40	36	32	28	24	20	4
FR	75 mm SA 35	75mmL17.1	AP	APHE 10M	475	48	44	40	36	32	28	24	20	16	0
FR	75 mm SA 35	75mmL17.1	APHE	-	500	44	42	40	37	34	31	29	26	23	12
FR	75 mm gun M97/33	75mmL30	AP	APHE 10M	575	58	54	50	46	42	38	34	30	26	10
FR	75 mm gun M97/33	75mmL30	APHE	APHE 16	575	53	46	40	37	34	31	29	26	23	12
FR	75 mm M1897	75mmL36	AP	0	575	67	63	58	54	49	45	40	36	31	13
FR	MAH MleF1 AT Mine	76mmATGr	HEAT	-	-	22	22	22	22	22	22	22	22	22	22
POL	Ckm wz. 30 machine gun	7.9mmMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
POL	7.92 mm wz. 25 Hotchkiss machine gun	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
POL	Wz. 35 Anti-Tank Rifle	7.92mmATR	AP		785	8	6	4	2	0	0	0	0	0	0
POL	Browning wz.1928	7.92mmLMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
POL	7.92 mm wz. 25 Hotchkiss machine gun (x2)	2x7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
POL	8 mm Hotchkiss machine gun	8mmMG	AP	-	856	8	6	4	2	0	0	0	0	0	0
POL	20 mm wz.38 model A (FK-A)	20mmL73	AP		600	20	17	13	10	6	3	0	0	0	0
POL	37 mm Puteaux SA 18	37mmL21	APC	APC 35	600	31	25	18	15	11	8	4	2	0	0
POL	37 mm Puteaux SA 18	37mmL21	AP	ODR mle.37	388	29	25	21	17	13	9	5	3	0	0
POL	37 mm Puteaux SA 18	37mmL21	APHE	ODR mle.92/24	367	12	10	8	6	4	2	0	0	0	0
POL	37 mm wz. 37 (Bofors)	37mmL45	AP		870	40	37	33	27	20	18	15	11	7	0
POL	37 mm wz. 37 (Bofors)	37mmL45	APHE	-	870	35	32	29	26	22	21	20	18	15	5
POL	37 mm wz. 36 (Bofors)	37mmL45	AP		870	40	37	33	27	20	18	15	11	7	0
POL	37 mm wz. 37 (Bofors)	37mmL45	AP		870	40	37	33	27	20	18	15	11	7	0
POL	40 mm Bofors gun	40mmL60	AP		881	55	51	47	42	37	32	27	22	18	0
POL	QF 3 pounder Hotchkiss	47mmL40	APHE	-	-	55	51	48	45	41	38	35	32	29	16
POL	53 mm ET wz.38	53mmATGr	HEAT	-	-	22	22	22	22	22	22	22	22	22	22
POL	75 mm wz.02/26	75mmL30	AP	-	575	58	54	50	46	42	38	34	30	26	10
POL	75 mm wz.02/26	75mmL30	APHE	-	-	53	46	40	37	34	31	29	26	23	12
BEL	Mitrailleuse de 7,5 mm MAC mle.31	7.5mmMG	AP	AP 29	785	16	11	7	5	2	1	0	0	0	0
BEL	Fusil-mitrailleur M24/M29	7.5mmLMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
BEL	M1918 Browning Automatic Rifle	7.62mmLMG	AP	-	823	8	6	4	2	0	0	0	0	0	0
BEL	7.92 mm wz. 25 Hotchkiss machine gun (x2)	2x7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
BEL	8 mm Hotchkiss Model 1909 machine-gun	8mmMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
BEL	13.2 mm Hotchkiss machine gun	13.2mmHMG	AP	AP 35	820	17	14	10	6	2	1	0	0	0	0
BEL	Oerlikon 20 mm cannon	20mmL70	AP	-	600	46	42	38	34	30	26	22	18	14	0
BEL	37 mm Puteaux SA 18	37mmL21	APC	-	600	31	25	18	15	11	8	4	2	0	0
BEL	37 mm Puteaux SA 18	37mmL21	AP	-	388	29	25	21	17	13	9	5	3	0	0
BEL	37 mm Puteaux SA 18	37mmL21	APHE	-	-	12	10	8	6	4	2	0	0	0	0
BEL	40 mm Bofors gun	40mmL60	AP		881	55	51	47	42	37	32	27	22	18	0
BEL	canon de 47 mm SA 34	47mmL30	AP	-	-	58	53	47	40	32	26	19	13	6	0
BEL	47 mm Model 1931 anti-tank gun	47mmL34	AP		450	58	53	47	40	32	26	19	13	6	0
BEL	75 mm Canon de 75 TR	75mmL30	AP	-	580	58	54	50	46	42	38	34	30	26	10
BEL	75 mm gun M97/33	75mmL30	AP	-	575	58	54	50	46	42	38	34	30	26	10
BEL	75 mm gun M97/33	75mmL30	APHE	-	-	53	46	40	37	34	31	29	26	23	12
BEL	75 mm Canon de 75 TR	75mmL30	APHE	-	-	53	46	40	37	34	31	29	26	23	12
BEL	75 mm Canon de 75 GPI	75mmL35	APHE	-	-	67	64	60	57	53	50	46	42	38	23
BEL	75 mm mle97/33 L/36	75mmL36	APHE	-	-	67	64	60	57	53	50	46	42	38	23
BEL	75 mm Canon de 75 GPIII	75mmL36.9	APHE	-	-	67	64	60	57	53	50	46	42	38	23
BEL	75 mm Canon de 75 GPII	75mmL37.4	APHE	-	-	67	64	60	57	53	50	46	42	38	23
BEL	MAH MleF1 AT Mine	76mmATGr	HEAT	-	-	22	22	22	22	22	22	22	22	22	22
BEL	105 mm GP	105mmL22	APHE	-	-	56	54	52	50	48	47	45	43	41	34
NET	Fusil-mitrailleur M24/M29	7.5mmLMG	AP	-	-	8	6	4	2	0	0	0	0	0	0

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
NET	8 mm Hotchkiss Model 1909 machine-gun	8mmMG	AP	-	820	8	6	4	2	0	0	0	0	0	0
NET	Oerlikon 20 mm cannon	20mmL70	AP	-	870	46	42	38	34	30	26	22	18	14	0
NET	37 mm Bofors Gun	37mmL34	AP		870	40	37	33	27	20	18	15	11	7	0
NET	37 mm Bofors	37mmL45	AP	-	870	40	37	33	27	20	18	15	11	7	0
NET	37 mm Bofors	37mmL45	APHE	-	-	35	32	29	26	22	21	20	18	15	5
NET	40 mm Bofors gun	40mmL60	AP		881	55	51	47	42	37	32	27	22	18	0
NET	canon de 47 mm SA 34	47mmL30	AP	-	-	39	36	33	30	26	23	20	17	14	1
NET	47 mm L/39	47mmL39	AP	-	-	39	36	33	30	26	23	20	17	14	1
NET	57 mm 6 veld L/25	57mmL25	AP	-	-	15	18	20	23	25	28	30	33	35	45
NET	75 mm gun M97/33	75mmL30	AP	-	575	58	54	50	46	42	38	34	30	26	10
NET	75 mm gun M97/33	75mmL30	APHE	-	-	53	46	40	37	34	31	29	26	23	12
NET	MAH MleF1 AT Mine	76mmATGr	HEAT	-	-	22	22	22	22	22	22	22	22	22	22
GE	7.92 mm EW 141 antitank rifle	7.92mmATR	AP	S.m.K.H.	785	8	6	4	2	0	0	0	0	0	0
GE	7.92 mm Maschinengewehr 34	7.92mmMG	AP	S. m. K.	785	8	6	4	2	0	0	0	0	0	0
GE	7.92 mm Maschinengewehr 42	7.92mmMG	AP	S. m. K.	785	8	6	4	2	0	0	0	0	0	0
GE	7.92 mm Panzerbüchse 38 Anti-Tank Rifle	7.92mmATR	AP	S.m.K.H.	785	8	6	4	2	0	0	0	0	0	0
GE	7.92 mm Panzerbüchse 39 Anti-Tank Rifle	7.92mmATR	AP	S.m.K.H.	760	8	6	4	2	0	0	0	0	0	0
GE	7.92 mm Maschinengewehr 34	7.92mmLMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
GE	7.92 mm Maschinengewehr 42	7.92mmLMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
GE	7.92 mm MG13 machine guns (x2)	2x7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
GE	7.92 mm Maschinengewehr 34 (x2)	2x7.92mmMG	AP	-	400	8	6	4	2	0	0	0	0	0	0
GE	MG151/15 mm cannon (x3)	3x15mmHMG	AP	-	-	16	16	15	15	14	14	13	13	12	10
GE	2 cm KwK 30 L/55	20mmL55	APCR	Pzgr 40	780	40	30	20	10	0	0	0	0	0	0
GE	2 cm KwK 30 L/55	20mmL55	AP	Pzgr	1050	20	17	14	12	9	6	4	2	0	0
GE	2 cm KwK 38 L/55	20mmL55	APCR	Pzgr 40	780	40	30	20	10	0	0	0	0	0	0
GE	2 cm KwK 38 L/55	20mmL55	AP	Pzgr	1050	20	17	14	12	9	6	4	2	0	0
GE	2 cm FlaK 30 L/65	20mmL65	APCR	Pzgr 40	780	40	30	20	10	0	0	0	0	0	0
GE	2 cm FlaK 30 L/65	20mmL65	AP	Pzgr	1050	20	17	14	12	9	6	4	2	0	0
GE	2 cm FlaK 38 L/65	20mmL65	APCR	Pzgr 40	780	40	30	20	10	0	0	0	0	0	0
GE	2 cm FlaK 38 L/65	20mmL65	AP	Pzgr	1050	20	17	14	12	9	6	4	2	0	0
GE	2 cm GebFlaK 38 L/65	20mmL65	APCR	Pzgr 40	780	40	30	20	10	0	0	0	0	0	0
GE	2 cm GebFlaK 38 L/65	20mmL65	AP	Pzgr	780	20	17	14	12	9	6	4	2	0	0
GE	MG151/20 mm Cannon (x3)	3x20mmC	AP	-	1050	20	17	14	12	9	6	4	2	0	0
GE	2 cm Flakvierling 38 Quad L/65 (x4)	4x20mmL65	APCR	Pzgr 40	900	40	30	20	10	0	0	0	0	0	0
GE	2 cm Flakvierling 38 Quad L/65 (x4)	4x20mmL65	AP	Pzgr	1400	20	17	14	12	9	6	4	2	0	0
GE	2,8 cm sPzB 41	28mmL61	APCNR	Pzgr.41	940	60	50	40	33	25	16	8	4	0	0
GE	3 cm Flak 38/103 (x2)	2x30mmL77	APCR	-	980	0	26	52	42	32	22	12	6	0	0
GE	3,7 cm KwK 34(t)	37mmL40	APCR	Pzgr 40	675	60	50	39	29	18	9	0	0	0	0
GE	3,7 cm KwK 34(t)	37mmL40	AP	Pzgr. (t)		35	33	30	27	23	22	21	19	16	7
GE	3,7 cm KwK 36 L/45	37mmL45	APCR	Pzgr 40	745	64	48	31	16	0	0	0	0	0	0
GE	3,7 cm KwK 36 L/45	37mmL45	APC	-	745	52	49	45	42	38	35	31	28	24	10
GE	3,7 cm KwK 36 L/45	37mmL45	AP	Pzgr	745	49	45	41	37	33	29	25	21	17	1
GE	3,7 cm KwK 36 L/45	37mmL45	APHE	-		35	32	29	26	22	21	20	18	15	5
GE	3,7 cm Pak 35 L/45	37mmL45	APCR	Pzgr 40	745	64	48	31	16	0	0	0	0	0	0
GE	3,7 cm Pak 35 L/45	37mmL45	APC	-	745	52	49	45	42	38	35	31	28	24	10
GE	3,7 cm Pak 35 L/45	37mmL45	AP	Pzgr	745	49	45	41	37	33	29	25	21	17	1
GE	3,7 cm Pak 35 L/45	37mmL45	APHE	-		35	32	29	26	22	21	20	18	15	5
GE	3,7 cm Pak 36 L/45	37mmL45	APCR	Pzgr 40	745	64	48	31	16	0	0	0	0	0	0
GE	3,7 cm Pak 36 L/45	37mmL45	APC	-	745	52	49	45	42	38	35	31	28	24	10
GE	3,7 cm Pak 36 L/45	37mmL45	AP	Pzgr	745	49	45	41	37	33	29	25	21	17	1
GE	3,7 cm Pak 36 L/45	37mmL45	APHE	-		35	32	29	26	22	21	20	18	15	5
GE	3,7 cm KwK 38(t) L/47.8	37mmL47.8	APCR	Pzgr 40	750	64	49	33	18	2	1	0	0	0	0
GE	3,7 cm KwK 38(t) L/47.8	37mmL47.8	APCBC	Pzgr. (t) umg.	741	41	37	33	30	27	26	24	21	18	7
GE	3,7 cm KwK 38(t) L/47.8	37mmL47.8	AP	Pzgr. (t)		36	34	31	28	24	23	22	20	17	8

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
GE	3,7 cm FlaK 18 L/57	37mmL57	AP	PzGr 18 - Pz.Sprgr	770	35	32	28	25	21	19	17	14	11	0
GE	3,7 cm Flak 36 L/57	37mmL57	AP	PzGr 18 - Pz.Sprgr	770	35	32	28	25	21	19	17	14	11	0
GE	3,7 cm Flak 37 L/57	37mmL57	AP	PzGr 18 - Pz.Sprgr	770	35	32	28	25	21	19	17	14	11	0
GE	3,7 cm FlaK 43 L/89	37mmL89	APCR	-	820	116	96	76	56	36	18	0	0	0	0
GE	3,7 cm FlaK 43 L/89	37mmL89	APC	-	820	96	92	89	85	82	78	75	71	68	54
GE	3,7 cm FlaK 43 L/89	37mmL89	APHE	-	770	35	32	28	25	21	19	17	14	11	0
GE	3,7 cm Flakzwilling 43 L/89 (x2)	2x37mmL89	APCR	-	820	116	106	96	86	76	66	56	46	36	0
GE	3,7 cm Flakzwilling 43 L/89 (x2)	2x37mmL89	APC	-	820	96	94	92	90	89	87	85	83	82	75
GE	3,7 cm Flakzwilling 43 L/89 (x2)	2x37mmL89	APHE	-	770	35	32	28	25	21	19	17	14	11	0
GE	4.2 cm Pak 41 L/52	42mmL50	AP	-	1265	50	46	42	38	34	30	26	22	18	2
GE	4.2 cm Pak 41 L/52	42mmL50	APCNR	Pzgr.41		90	81	72	63	53	44	35	25	16	0
GE	4.7cm PaK(t) L/43.4	47mmL43	APCR	Pzgr 40	782	100	80	59	39	18	9	0	0	0	0
GE	4.7cm PaK(t) L/43.4	47mmL43	APC	Pzgr. 36 (t)		54	51	48	45	41	38	35	32	29	16
GE	5 cm KwK 38 L/42	50mmL42	APCR	Pzgr 40	685	94	75	55	38	21	11	0	0	0	0
GE	5 cm KwK 38 L/42	50mmL42	APC	Pzgr.39	685	55	51	47	42	37	33	28	24	19	1
GE	5 cm KwK 38 L/42	50mmL42	AP	Pzgr		53	48	43	38	32	28	24	19	14	0
GE	5 cm KwK 39 L/60	50mmL60	APCR	Pzgr 40	823	130	101	72	55	38	19	0	0	0	0
GE	5 cm KwK 39 L/60	50mmL60	APC	Pzgr.umg	835	72	67	61	56	50	45	39	34	28	6
GE	5 cm KwK 39 L/60	50mmL60	AP	Pzgr	550	67	62	57	51	44	39	34	29	23	1
GE	5 cm KwK 39 L/60	50mmL60	HEAT	Steil.Gr.42	550	37	37	37	37	37	37	37	37	37	37
GE	5 cm Pak 38 L/60	50mmL60	APCR	Pzgr 40	823	130	101	72	55	38	19	0	0	0	0
GE	5 cm Pak 38 L/60	50mmL60	APC	Pzgr.umg	835	72	67	61	56	50	45	39	34	28	6
GE	5 cm Pak 38 L/60	50mmL60	AP	Pzgr	550	67	62	57	51	44	39	34	29	23	1
GE	5 cm Pak 38 L/60	50mmL60	HEAT	Steil.Gr.42	550	37	37	37	37	37	37	37	37	37	37
GE	5cm Flak 41 L/86	50mmL86	AP	Pzgr	840	70	66	62	58	54	50	46	42	38	22
GE	7,5 cm Leichtgeschütz 40	75mmRCL	AP	Pzgr.rot	350	50	46	41	37	32	28	23	19	14	0
GE	7,5 cm le I.G.18 L/12	75mmL12	HEAT	Gr.38 Hl	260	34	34	34	34	34	34	34	34	34	34
GE	7,5 cm le I.G.18 L/12	75mmL12	HEATi	-	210	72	72	72	72	72	72	72	72	72	72
GE	7,5 cm Geb.G.36 L/19	75mmL19	HEAT	Gr.38 HL/B	475	56	56	56	56	56	56	56	56	56	56
GE	7,5 cm I.G.37 L/24	75mmL24	AP	PzGr. 39/43	395	56	54	51	48	45	42	40	37	34	23
GE	7,5 cm I.G.37 L/24	75mmL24	APHE	Gr.38 Hl	280	41	40	39	37	35	34	33	32	30	25
GE	7,5 cm I.G.37 L/24	75mmL24	HEAT	Gr.38 Hl/A/B	280	60	60	60	60	60	60	60	60	60	60
GE	7,5 cm I.G.37 L/24	75mmL24	HEATi	Gr.38 Hl/C	280	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm I.G.42 L/24	75mmL24	AP	PzGr. 39/43	395	56	54	51	48	45	42	40	37	34	23
GE	7,5 cm I.G.42 L/24	75mmL24	APHE	Gr.38 Hl	280	41	40	39	37	35	34	33	32	30	25
GE	7,5 cm I.G.42 L/24	75mmL24	HEAT	Gr.38 Hl/A/B	280	60	60	60	60	60	60	60	60	60	60
GE	7,5 cm I.G.42 L/24	75mmL24	HEATi	Gr.38 Hl/C	280	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm KwK 37 L/24	75mmL24	AP	PzGr. 39/43	395	56	54	51	48	45	42	40	37	34	23
GE	7,5 cm KwK 37 L/24	75mmL24	APHE	Gr.38 Hl	280	41	40	39	37	35	34	33	32	30	25
GE	7,5 cm KwK 37 L/24	75mmL24	HEAT	Gr.38 Hl/A/B	280	60	60	60	60	60	60	60	60	60	60
GE	7,5 cm KwK 37 L/24	75mmL24	HEATi	Gr.38 Hl/C	280	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm StuK 37 L/24	75mmL24	AP	PzGr. 39/43	395	56	54	51	48	45	42	40	37	34	23
GE	7,5 cm StuK 37 L/24	75mmL24	APHE	Gr.38 Hl	280	41	40	39	37	35	34	33	32	30	25
GE	7,5 cm StuK 37 L/24	75mmL24	HEAT	Gr.38 Hl/A/B	280	60	60	60	60	60	60	60	60	60	60
GE	7,5 cm StuK 37 L/24	75mmL24	HEATi	Gr.38 Hl/C	280	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm le F.K.18 L/26	75mmL26	HEAT	Gr.38 Hl/A/B	380	52	52	52	52	52	52	52	52	52	52
GE	7,5 cm le F.K.18 L/26	75mmL26	HEATi	Gr.38 Hl/C	485	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm F.K.38 L/34	75mmL34	HEAT	Gr.38 HL/B	605	56	56	56	56	56	56	56	56	56	56
GE	7,5 cm F.K.16 nA L/36	75mmL36	AP	K.Gr.rot.Pz.	450	65	62	60	58	55	53	51	49	46	37
GE	7,5 cm F.K.16 nA L/36	75mmL36	HEAT	Gr.97/38 HL/A (f)	450	52	52	52	52	52	52	52	52	52	52
GE	7,5 cm F.K.16 nA L/36	75mmL36	HEATi	Gr.38 Hl/C	755	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm Pak 97/38(f) L/36.3	75mmL36	AP	K.Gr.rot.Pz.	450	65	62	60	58	55	53	51	49	46	37
GE	7,5 cm Pak 97/38(f) L/36.3	75mmL36	HEAT	Gr.97/38 HL/A (f)	450	52	52	52	52	52	52	52	52	52	52
GE	7,5 cm Pak 97/38(f) L/36.3	75mmL36	HEATi	Gr.38 Hl/B	755	67	67	67	67	67	67	67	67	67	67
GE	7,5 cm Pak 41 L/39.3	75mmL39.3	AP	0	1125	87	82	76	70	63	57	51	47	43	21
GE	7,5 cm Pak 41 L/39.3	75mmL39.3	APCNR	Pzgr.41 (HK)	380	198	185	171	158	145	134	122	112	102	54

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
GE	7,5 cm KwK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
GE	7,5 cm KwK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
GE	7,5 cm KwK 40 L/43	75mmL43	AP	-	475	90	86	81	77	72	68	63	59	54	36
GE	7,5 cm KwK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
GE	7,5 cm KwK 40 L/43	75mmL43	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm StuK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
GE	7,5 cm StuK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
GE	7,5 cm StuK 40 L/43	75mmL43	AP	-	450	90	86	81	77	72	68	63	59	54	36
GE	7,5 cm StuK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
GE	7,5 cm StuK 40 L/43	75mmL43	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm PaK 40 L/46	75mmL46	APCR	Pzgr 40	750	143	132	120	109	97	87	77	66	55	11
GE	7,5 cm PaK 40 L/46	75mmL46	APCBC	Pzgr.39	450	100	95	90	85	79	74	68	63	58	37
GE	7,5 cm PaK 40 L/46	75mmL46	HEAT	Gr.38 HL/B	550	56	56	56	56	56	56	56	56	56	56
GE	7,5 cm KwK 40 L/48	75mmL48	APCR	Pzgr 40	790	143	132	120	109	97	87	77	66	55	11
GE	7,5 cm KwK 40 L/48	75mmL48	APCBC	Pzgr.39	450	106	101	96	91	85	80	74	69	64	43
GE	7,5 cm KwK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
GE	7,5 cm KwK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm Pak 39 L/48	75mmL48	APCR	Pzgr 40	790	143	132	120	109	97	87	77	66	55	11
GE	7,5 cm Pak 39 L/48	75mmL48	APCBC	Pzgr.39	450	106	101	96	91	85	80	74	69	64	43
GE	7,5 cm Pak 39 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
GE	7,5 cm Pak 39 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm StuK 40 L/48	75mmL48	APCR	Pzgr 40	790	143	132	120	109	97	87	77	66	55	11
GE	7,5 cm StuK 40 L/48	75mmL48	APCBC	Pzgr.39	680	106	101	96	91	85	80	74	69	64	43
GE	7,5 cm StuK 40 L/48	75mmL48	AP	-	450	90	86	81	77	72	68	63	59	54	36
GE	7,5 cm StuK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
GE	7,5 cm StuK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
GE	7,5 cm KwK 42 L/70	75mmL70	APCR	Pzgr 40/42	935	194	184	174	162	149	138	127	117	106	62
GE	7,5 cm KwK 42 L/70	75mmL70	APCBC	Pzgr. 39/42	935	138	132	125	118	111	105	99	93	87	52
GE	7,5 cm KwK 42 L/70	75mmL70	APCBC	Pzgr.39/42	1130	138	131	124	118	111	105	99	94	89	65
GE	7,5 cm Pak 42 L/70	75mmL70	APCR	Pzgr 40/42	935	194	184	174	162	149	138	127	117	106	62
GE	7,5 cm Pak 42 L/70	75mmL70	APCBC	Pzgr.39/42	1130	138	131	124	118	111	105	99	94	89	65
GE	76.2 mm M1902/1930	76.2mmL30	APHE	-	662	68	64	60	56	52	48	44	40	36	20
GE	7.62 cm FK L/51.2	76.2mmL51.2	APCR	Pzgr 40	740	152	135	118	105	92	82	71	63	55	7
GE	7.62 cm FK L/51.2	76.2mmL51.2	APCBC	Pzgr.39 rot	690	108	103	98	93	88	84	79	75	71	53
GE	7.62 cm FK L/51.2	76.2mmL51.2	APC	-	450	108	103	97	92	86	81	75	70	64	42
GE	7.62 cm FK L/51.2	76.2mmL51.2	HEAT	Gr. 38 HL/B	450	56	56	56	56	56	56	56	56	56	56
GE	7.62 cm FK L/51.2	76.2mmL51.2	HEATi	Gr. 38 HL/C	550	75	75	75	75	75	75	75	75	75	75
GE	7.62 cm Pak 36(r) L/51.2	76.2mmL51.2	APCR	Pzgr 40	740	152	135	118	105	92	82	71	63	55	7
GE	7.62 cm Pak 36(r) L/51.2	76.2mmL51.2	APCBC	Pzgr.39 rot	690	108	103	98	93	88	84	79	75	71	53
GE	7.62 cm Pak 36(r) L/51.2	76.2mmL51.2	APC	-	450	108	103	97	92	86	81	75	70	64	42
GE	7.62 cm Pak 36(r) L/51.2	76.2mmL51.2	HEAT	Gr. 38 HL/B	450	56	56	56	56	56	56	56	56	56	56
GE	7.62 cm Pak 36(r) L/51.2	76.2mmL51.2	HEATi	Gr. 38 HL/C	550	75	75	75	75	75	75	75	75	75	75
GE	88 mm RPzB Panzerschreck	88mmATRL	HEAT	-	-	156	156	156	156	156	156	156	156	156	156
GE	8,8 cm Flak 18 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
GE	8,8 cm Flak 18 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
GE	8,8 cm Flak 18 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
GE	8,8 cm Flak 18 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
GE	8,8 cm Flak 18 L/56	88mmL56	HEAT	Gr.39 Hl/A	600	67	67	67	67	67	67	67	67	67	67
GE	8,8 cm Flak 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
GE	8,8 cm Flak 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
GE	8,8 cm Flak 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
GE	8,8 cm Flak 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
GE	8,8 cm Flak 36 L/56	88mmL56	HEAT	Gr.39 Hl/A	600	67	67	67	67	67	67	67	67	67	67
GE	8,8 cm Flak 37 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
GE	8,8 cm Flak 37 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
GE	8,8 cm Flak 37 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
GE	8,8 cm Flak 37 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
GE	8,8 cm Flak 37 L/56	88mmL56	HEAT	Gr.39 Hl/A	600	67	67	67	67	67	67	67	67	67	67
GE	8,8 cm KwK 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
GE	8,8 cm KwK 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
GE	8,8 cm KwK 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
GE	8,8 cm KwK 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
GE	8,8 cm KwK 36 L/56	88mmL56	HEAT	Gr.39 Hl/A	600	67	67	67	67	67	67	67	67	67	67
GE	8,8 cm Flak 41 L/70	88mmL71	HEAT	Gr.39 HL	1130	90	90	90	90	90	90	90	90	90	90
GE	8,8 cm Flak 41 L/70	88mmL71	APCR	Pzgr 40/43	1000	237	227	217	205	193	182	170	161	152	110
GE	8,8 cm Flak 41 L/70	88mmL71	APCBC	Pzgr.39/43	1000	202	194	185	175	165	157	148	140	132	97
GE	8,8 cm Flak 41 L/70	88mmL71	APHE	-		64	61	58	56	53	50	47	44	41	30
GE	8,8 cm KwK 43 L/71	88mmL71	APCR	Pzgr 40/43	1000	237	227	217	205	193	182	170	161	152	110
GE	8,8 cm KwK 43 L/71	88mmL71	APCBC	Pzgr.39/43		202	194	185	175	165	157	148	140	132	97
GE	8,8 cm Pak 43 L/71	88mmL71	APCR	Pzgr 40/43	1000	237	227	217	205	193	182	170	161	152	110
GE	8,8 cm Pak 43 L/71	88mmL71	APCBC	Pzgr.39/43		202	194	185	175	165	157	148	140	132	97
GE	8,8 cm Pak 43/41 L/71	88mmL71	APCR	Pzgr 40/43	1000	237	227	217	205	193	182	170	161	152	110
GE	8,8 cm Pak 43/41 L/71	88mmL71	APCBC	Pzgr.39/43		202	194	185	175	165	157	148	140	132	97
GE	Faustpatrone 30	100mmRPG	HEAT	-	193	104	104	104	104	104	104	104	104	104	104
GE	10,5 cm leFH 16 L/22	105mmL22	APHE	-	395	56	54	52	50	48	47	45	43	41	34
GE	10,5 cm leFH 18/39 L/25.8	105mmL25.8	APDS	Pzgr. 39 (ts)	470	102	97	91	86	80	75	69	64	58	36
GE	10,5 cm leFH 18/39 L/25.8	105mmL25.8	APCBC	Pzgr.rot	395	63	61	59	57	54	52	50	48	46	38
GE	10,5 cm leFH 18/39 L/25.8	105mmL25.8	APHE	Pzgr	495	56	54	52	50	48	47	45	43	41	34
GE	10,5 cm leFH 18/39 L/25.8	105mmL25.8	HEAT	Gr.39 Hl	470	52	52	52	52	52	52	52	52	52	52
GE	10,5 cm leFH 18/40 L/25.8	105mmL25.8	APDS	Pzgr. 39 (ts)	470	102	97	91	86	80	75	69	64	58	36
GE	10,5 cm leFH 18/40 L/25.8	105mmL25.8	APCBC	Pzgr.rot	395	63	61	59	57	54	52	50	48	46	38
GE	10,5 cm leFH 18/40 L/25.8	105mmL25.8	APHE	Pzgr	495	56	54	52	50	48	47	45	43	41	34
GE	10,5 cm leFH 18/40 L/25.8	105mmL25.8	HEAT	Gr.39 Hl	470	52	52	52	52	52	52	52	52	52	52
GE	10,5 cm Geb.H.40 L/27.3	105mmL27.3	HEAT	Gr.39 HL/A	565	60	60	60	60	60	60	60	60	60	60
GE	10,5 cm leFH 18 L/28	105mmL28	APDS	Pzgr. 39 (ts)	470	102	97	91	86	80	75	69	64	58	36
GE	10,5 cm leFH 18 L/28	105mmL28	APCBC	Pzgr.rot	395	63	61	59	57	54	52	50	48	46	38
GE	10,5 cm leFH 18 L/28	105mmL28	APHE	Pzgr	495	56	54	52	50	48	47	45	43	41	34
GE	10,5 cm leFH 18 L/28	105mmL28	HEAT	Gr.39 Hl	470	52	52	52	52	52	52	52	52	52	52
GE	10,5 cm leFH 18M L/31.5	105mmL31.5	APDS	Pzgr. 39 (ts)	470	102	97	91	86	80	75	69	64	58	36
GE	10,5 cm leFH 18M L/31.5	105mmL31.5	APCBC	Pzgr.rot	395	63	61	59	57	54	52	50	48	46	38
GE	10,5 cm leFH 18M L/31.5	105mmL31.5	APHE	Pzgr	495	56	54	52	50	48	47	45	43	41	34
GE	10,5 cm leFH 18M L/31.5	105mmL31.5	HEAT	Gr.39 Hl	540	52	52	52	52	52	52	52	52	52	52
GE	10,5 cm StuH 42 L/31.5	105mmL31.5	APCBC	Pzgr.rot	395	63	61	59	57	54	52	50	48	46	38
GE	10,5 cm StuH 42 L/31.5	105mmL31.5	APHE	Pzgr	495	56	54	52	50	48	47	45	43	41	34
GE	10,5 cm StuH 42 L/31.5	105mmL31.5	HEAT	Gr.39 Hl	540	52	52	52	52	52	52	52	52	52	52
GE	10 cm sK 18 L/52	105mmL52	AP	Pzgr	835	0	-5	-9	-5	0	0	0	0	0	0
GE	10,5 cm Flak 38 L/52.8	105mmL52.8	APCBC	Pz.Sprgr.	827	156	152	148	144	140	136	132	128	124	108
GE	10,5 cm Flak 38 L/52.8	105mmL52.8	APHE		881	130	127	124	121	119	116	113	110	107	96
GE	107 mm gun M1910/30g	107mmL38	APBC	BR-420	296	95	93	90	87	84	81	78	75	72	61
GE	Panzerwurfmine	114mmATGr	HEAT	-		66	66	66	66	66	66	66	66	66	66
GE	12,8 cm KwK 44 L/55	128mmL55	APCBC	Pzgr.43	860	187	183	178	173	167	162	157	153	148	129
GE	12,8 cm KwK 44 L/55	128mmL55	APC	Pzgr	450	189	178	166	155	143	135	127	122	117	81
GE	12,8 cm KwK 44 L/55	128mmL55	HEAT	Gr. 38 HL/C	750	75	75	75	75	75	75	75	75	75	75
GE	12,8 cm PaK 44 L/55	128mmL55	APCBC	Pzgr.43	860	187	183	178	173	167	162	157	153	148	129
GE	12,8 cm PaK 44 L/55	128mmL55	APC	Pzgr	450	189	178	166	155	143	135	127	122	117	81
GE	12,8 cm PaK 44 L/55	128mmL55	HEAT	Gr. 38 HL/C	750	75	75	75	75	75	75	75	75	75	75
GE	12,8 cm Flak 40 L/61	128mmL61	APC	Pzgr	880	201	189	176	163	150	141	132	126	120	80
GE	Panzerfaust 100	149mmRPG100	HEAT	-	85	164	164	164	164	164	164	164	164	164	164
GE	Panzerfaust 150	149mmRPG150	HEAT	-	85	163	163	163	163	163	163	163	163	163	163
GE	Panzerfaust 30	149mmRPG30	HEAT	-	85	149	149	149	149	149	149	149	149	149	149
GE	Panzerfaust 60	149mmRPG60	HEAT	-		114	114	114	114	114	114	114	114	114	114
GE	Rochen-1000	150mmATGW10	HEAT	-	110	164	164	164	164	164	164	164	164	164	164

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
GE	Rochen-2000	150mmATGW20	HEAT	-	110	164	164	164	164	164	164	164	164	164	164
GE	Rochen-600	150mmATGW6	HEAT	-	110	164	164	164	164	164	164	164	164	164	164
GE	15 cm Rotkäppchen	150mmATGW	HEAT	-	-	154	154	154	154	154	154	154	154	154	154
GE	15 cm sIG 33 L/11	150mmL11	APHE	-	240	32	29	26	24	21	18	15	12	9	0
GE	15 cm sIG 33 L/11	150mmL11	HEAT	Gr.39 HL/A	240	119	119	119	119	119	119	119	119	119	119
GE	15 cm StuH 43 L/12	150mmL12	HEAT	Gr.39 HL/A	280	119	119	119	119	119	119	119	119	119	119
GE	15 cm s F.H.36 L/19.8	150mmL19.8	HEAT	Gr.39 Hl	495	119	119	119	119	119	119	119	119	119	119
GE	15 cm s F.H.18 L/30	150mmL30	HEAT	Gr.39 Hl	495	119	119	119	119	119	119	119	119	119	119
GE	15 cm sFH 18/1 L/30	150mmL30	HEAT	Gr.39 Hl	495	119	119	119	119	119	119	119	119	119	119
GE	15 cm s F.H.18M L/32.4	150mmL32.4	HEAT	Gr.39 Hl	495	119	119	119	119	119	119	119	119	119	119
GE	15 cm s F.H.18/40 L/32.8	150mmL32.8	HEAT	Gr.39 Hl	495	119	119	119	119	119	119	119	119	119	119
GE	Tellermine	318mmATGr	HEAT	-	-	119	119	119	119	119	119	119	119	119	119
GE	38 cm RW 61 rocket launcher L/5.4	380mmR	HEAT		250	187	187	187	187	187	187	187	187	187	187
IT	6.5 mm Breda M30 MG	6.5mmMG	AP	-	700	8	6	4	2	0	0	0	0	0	0
IT	6.5 mm Breda M30 MG	6.5mmLMG	AP	-	620	-	-	-	-	-	-	-	-	-	-
IT	6.5 mm Breda M30 MG (x2)	2x6.5mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
IT	8 mm Breda M37 MG	8mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
IT	8 mm Breda M37 MG	2x8mmMG	AP	-	429	8	6	4	2	0	0	0	0	0	0
IT	13.2 mm Breda MG	13.2mmHMG	AP	-	856	11	10	9	8	7	6	5	4	3	0
IT	20 mm Solothurn S18/1000 ATR	20mmATR	AP		840	20	17	13	10	6	3	0	0	0	0
IT	20 mm 20/65 Breda 35	20mmL65	AP		840	0	12	24	20	16	12	8	4	0	0
IT	20 mm Cannone da 20/65	20mmL65	AP		830	0	12	24	20	16	12	8	4	0	0
IT	Cannone da 20/77	20mmL77	AP		600	20	17	13	10	6	3	0	0	0	0
IT	37 mm Puteaux SA 18	37mmL21	APC	-	600	31	25	18	15	11	8	4	2	0	0
IT	37 mm Puteaux SA 18	37mmL21	AP	-	388	29	25	21	17	13	9	5	3	0	0
IT	37 mm Puteaux SA 18	37mmL21	APHE	-	388	12	10	8	6	4	2	0	0	0	0
IT	37 mm 3000B	37mmL40	AP	-	675	35	33	30	27	23	22	21	19	16	7
IT	37 mm Vickers-Terni L/40	37mmL40	AP	-	675	35	33	30	27	23	22	21	19	16	7
IT	Cannone da 37/45	37mmL45	APCR	Pzgr 40	745	64	48	31	16	0	0	0	0	0	0
IT	Cannone da 37/45	37mmL45	APC	-	745	52	49	45	42	38	35	31	28	24	10
IT	Cannone da 37/45	37mmL45	AP	Pzgr	745	49	45	41	37	33	29	25	21	17	1
IT	Cannone da 37/45	37mmL45	APHE	-		35	32	29	26	22	21	20	18	15	5
IT	Cannone da 37/54	37mmL54	AP		870	40	37	33	27	20	18	15	11	7	0
IT	47 mm Breda 47/32 gun	47mmL32	AP		250	43	38	32	28	24	17	11	5	0	0
IT	47 mm Breda 47/32 gun	47mmL32	HEAT			84	84	84	84	84	84	84	84	84	84
IT	47 mm Cannone da 47/32 M35	47mmL32	AP		250	43	38	32	28	24	17	11	5	0	0
IT	47 mm Cannone da 47/32 M35	47mmL32	HEAT			84	84	84	84	84	84	84	84	84	84
IT	47 mm Cannone da 47/32-34 M35	47mmL34	AP			58	51	43	38	32	26	19	13	6	0
IT	47 mm Cannone da 47/32-34 M35	47mmL34	HEAT			84	84	84	84	84	84	84	84	84	84
IT	Cannone da 47/40	47mmL40	AP	-		55	51	48	45	41	38	35	32	29	16
IT	Cannone da 47/40	47mmL40	HEAT	-	-	84	84	84	84	84	84	84	84	84	84
IT	Cannone da 70/15	70mmL16	AP	-	353	69	65	60	56	51	47	42	38	33	15
IT	Cannone da 70/15	70mmL16	HEAT	-	353	90	90	90	90	90	90	90	90	90	90
IT	Obice da 75/18 modello 34	75mmL18	AP	-	425	48	44	40	36	32	28	24	20	16	0
IT	Obice da 75/18 modello 34	75mmL18	HEAT		425	75	75	75	75	75	75	75	75	75	75
IT	Obice 75/18 modello 35	75mmL21	AP	-	425	42	40	38	36	34	31	28	25	23	12
IT	Obice 75/18 modello 35	75mmL21	HEAT		425	75	75	75	75	75	75	75	75	75	75
IT	7,5 cm KwK 37 L/24	75mmL24	AP	PzGr. 39/43	395	56	54	51	48	45	42	40	37	34	23
IT	7,5 cm KwK 37 L/24	75mmL24	APHE	Gr.38 Hl	280	41	40	39	37	35	34	33	32	30	25
IT	7,5 cm KwK 37 L/24	75mmL24	HEAT	Gr.38 Hl/A/B	280	60	60	60	60	60	60	60	60	60	60
IT	7,5 cm KwK 37 L/24	75mmL24	HEATi	Gr.38 Hl/C	280	86	86	86	86	86	86	86	86	86	86
IT	Cannone 75/27 modello 06	75mmL30	AP	-	502	53	48	44	39	35	30	26	21	17	0
IT	Ansaldo 75/34	75mmL34	APCBC		596	65	62	60	58	55	53	51	49	46	37
IT	Ansaldo 75/34	75mmL34	AP		596	67	64	60	57	53	50	46	42	38	23
IT	75/34 modello 34	75mmL34	APCBC		596	65	62	60	58	55	53	51	49	46	37
IT	75/34 modello 34	75mmL34	AP		596	67	64	60	57	53	50	46	42	38	23

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
IT	7,5 cm KwK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
IT	7,5 cm KwK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
IT	7,5 cm KwK 40 L/43	75mmL43	AP	-	450	90	86	81	77	72	68	63	59	54	36
IT	7,5 cm KwK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	550	56	56	56	56	56	56	56	56	56	56
IT	75 mm L46 modello 34	75mmL46	APCBC		750	100	95	90	85	79	74	68	63	58	37
IT	7,5 cm StuK 40 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
IT	7,5 cm StuK 40 L/48	75mmL48	APCBC	-	680	106	101	96	91	85	80	74	69	64	43
IT	7,5 cm StuK 40 L/48	75mmL48	AP	-	450	90	86	81	77	72	68	63	59	54	36
IT	7,5 cm StuK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
IT	7,5 cm StuK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
IT	8,8 cm Flak 18 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
IT	8,8 cm Flak 18 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
IT	8,8 cm Flak 18 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
IT	8,8 cm Flak 18 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
IT	8,8 cm Flak 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
IT	8,8 cm Flak 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
IT	8,8 cm Flak 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
IT	8,8 cm Flak 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
IT	8,8 cm Flak 37 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
IT	8,8 cm Flak 37 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
IT	8,8 cm Flak 37 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
IT	8,8 cm Flak 37 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
IT	Cannone da 90/53	90mmL52.6	AP		830	160	150	140	130	120	110	100	90	80	40
IT	Obice 100/17 modello 14	100mmL19	AP	-	395	56	51	47	42	38	33	29	24	20	2
IT	Panzerwurfmine	114mmATGr	HEAT	-	300	66	66	66	66	66	66	66	66	66	66
IT	Cannone da 149/40 modello 35	149mmL41	AP	-	800	193	189	184	180	175	171	166	162	157	139
IT	Bakelite Anti-Tank Mine	295mmATGr	HEAT	-	-	75	75	75	75	75	75	75	75	75	75
RUM	7.92 mm Maschinengewehr 34	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
RUM	PzB 39 (rum)	7.92mmATR	AP	-	785	8	6	4	2	0	0	0	0	0	0
RUM	7.92 mm Schwarzlose MG vz. 07/24	7.92mmMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
RUM	ZB LMG model 1930	7.92mmLMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
RUM	13.2 mm Hotchkiss HMG	13.2mmHMG	AP	-	780	11	10	9	8	7	6	5	4	3	0
RUM	2 cm KwK 30 L/55	20mmL55	AP	Pzgr	950	20	17	14	11	8	5	2	1	0	0
RUM	25 mm A/T gun SA 34	25mmL72	AP	-	-	35	33	30	25	20	16	13	9	5	0
RUM	37 mm Puteaux SA 18	37mmL21	APC	-	600	31	25	18	15	11	8	4	2	0	0
RUM	37 mm Puteaux SA 18	37mmL21	AP	-	388	29	25	21	17	13	9	5	3	0	0
RUM	37 mm Puteaux SA 18	37mmL21	APHE	-	-	12	10	8	6	4	2	0	0	0	0
RUM	37.2 mm ÚV vz. 34 gun L/40	37mmL37	AP	-	-	35	33	30	27	23	22	21	19	16	7
RUM	3,7 cm KwK 34(t)	37mmL40	AP	-	-	35	33	30	27	23	22	21	19	16	7
RUM	37 mm Bofors	37mmL45	AP	-	870	40	37	33	27	20	18	15	11	7	0
RUM	37 mm Bofors	37mmL45	APHE	-	-	35	32	29	26	22	21	20	18	15	5
RUM	3,7 cm KwK 38(t) L/47.8	37mmL47.8	APCR	Pzgr 40	741	64	49	33	18	2	1	0	0	0	0
RUM	3,7 cm KwK 38(t) L/47.8	37mmL47.8	AP	Pzgr. (t)		36	34	31	28	24	23	22	20	17	8
RUM	37 mm Bofors L/54	37mmL54	AP		870	40	37	33	27	20	18	15	11	7	0
RUM	40 mm Bofors gun	40mmL60	AP		881	55	51	47	42	37	32	27	22	18	0
RUM	45 mm Gun	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
RUM	45 mm Gun	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
RUM	45 mm Gun	45mmL46	APBC	BRZ-240	-	53	46	38	31	23	16	8	4	0	0
RUM	47 mm Cannone da 47/32	47mmL32	AP		250	43	38	32	28	24	17	11	5	0	0
RUM	47 mm Cannone da 47/32	47mmL32	HEAT		-	84	84	84	84	84	84	84	84	84	84
RUM	canon de 47 mm SA 37	47mmL45	APCBC	ODR mle.36	855	57	53	49	46	42	39	36	33	29	15
RUM	canon de 47 mm SA 37	47mmL45	APC	ODR mle.35	855	71	67	64	60	57	53	50	46	43	29
RUM	canon de 47 mm SA 37	47mmL45	AP	-	-	52	48	44	40	36	32	28	24	20	4
RUM	47 mm A/T gun L/53	47mmL53	AP	-	-	55	51	48	45	41	38	35	32	29	16
RUM	5 cm KwK 39 L/60	50mmL60	APCR	-	823	130	101	72	55	38	19	0	0	0	0
RUM	5 cm KwK 39 L/60	50mmL60	APC	-	835	72	67	61	56	50	45	39	34	28	6

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
RUM	5 cm KwK 39 L/60	50mmL60	AP	Pzgr	550	67	62	57	51	44	39	34	29	23	1
RUM	5 cm KwK 39 L/60	50mmL60	HEAT	Steil.Gr.42	-	37	37	37	37	37	37	37	37	37	37
RUM	75 mm C6 M39	75mmL20.9	AP	-	-	56	54	51	48	45	42	40	37	34	23
RUM	7,5 cm KwK 37 L/24	75mmL24	AP	PzGr. 39/43	395	56	54	51	48	45	42	40	37	34	23
RUM	7,5 cm KwK 37 L/24	75mmL24	APHE	Gr.38 Hl	280	41	40	39	37	35	34	33	32	30	25
RUM	7,5 cm KwK 37 L/24	75mmL24	HEAT	Gr.38 Hl/A/B	280	60	60	60	60	60	60	60	60	60	60
RUM	7,5 cm KwK 37 L/24	75mmL24	HEATi	Gr.38 Hl/C	280	86	86	86	86	86	86	86	86	86	86
RUM	7,5 cm F.K.16 nA L/36	75mmL36	AP	-	450	65	62	60	58	55	53	51	49	46	37
RUM	7,5 cm F.K.16 nA L/36	75mmL36	HEAT	Gr.97/38 HL/A (f)	450	52	52	52	52	52	52	52	52	52	52
RUM	7,5 cm F.K.16 nA L/36	75mmL36	HEATi	Gr.38 Hl/C	-	86	86	86	86	86	86	86	86	86	86
RUM	7,5 cm Pak 97/38(f) L/36.3	75mmL36.3	AP	-	450	65	62	60	58	55	53	51	49	46	37
RUM	7,5 cm Pak 97/38(f) L/36.3	75mmL36.3	HEAT	Gr.97/38 HL/A (f)	450	52	52	52	52	52	52	52	52	52	52
RUM	7,5 cm Pak 97/38(f) L/36.3	75mmL36.3	HEATi	Gr.38 Hl/B	-	67	67	67	67	67	67	67	67	67	67
RUM	7,5 cm KwK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
RUM	7,5 cm KwK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
RUM	7,5 cm KwK 40 L/43	75mmL43	AP	-	450	90	86	81	77	72	68	63	59	54	36
RUM	7,5 cm KwK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	550	56	56	56	56	56	56	56	56	56	56
RUM	7,5 cm StuK 40 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
RUM	7,5 cm StuK 40 L/48	75mmL48	APCBC	-	450	106	101	96	91	85	80	74	69	64	43
RUM	7,5 cm StuK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
RUM	7,5 cm StuK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
RUM	76.2 mm F-22 USV M1939	76.2mmL42	APCR	Pzgr 40	662	152	135	118	105	92	82	71	63	55	7
RUM	76.2 mm F-22 USV M1939	76.2mmL42	APHE	BR-350A	450	67	64	61	58	55	52	49	46	43	31
RUM	76.2 mm F-22 USV M1939	76.2mmL42	HEAT	Gr. 38 HL/B	450	56	56	56	56	56	56	56	56	56	56
RUM	76.2 mm F-22 USV M1939	76.2mmL42	HEATi	Gr. 38 HL/C	710	75	75	75	75	75	75	75	75	75	75
RUM	76.2 mm F-22 M1936	76.2mmL51.2	APCR	Pzgr 40	740	152	135	118	105	92	82	71	63	55	7
RUM	76.2 mm F-22 M1936	76.2mmL51.2	APCBC	Pzgr.39 rot	450	108	103	98	93	88	84	79	75	71	53
RUM	76.2 mm F-22 M1936	76.2mmL51.2	HEAT	Gr. 38 HL/B	450	56	56	56	56	56	56	56	56	56	56
RUM	76.2 mm F-22 M1936	76.2mmL51.2	HEATi	Gr. 38 HL/C	710	75	75	75	75	75	75	75	75	75	75
RUM	76.2 mm F-22 M1936	76.2mmL51.2	APC	-	990	108	103	97	92	86	81	75	70	64	42
RUM	7.62 cm Pak 36(r) L/51.2	76.2mmL51.2	APCR	Pzgr 40	740	152	135	118	105	92	82	71	63	55	7
RUM	7.62 cm Pak 36(r) L/51.2	76.2mmL51.2	APCBC	Pzgr.39 rot	450	108	103	98	93	88	84	79	75	71	53
RUM	7.62 cm Pak 36(r) L/51.2	76.2mmL51.2	HEAT	Gr. 38 HL/B	450	56	56	56	56	56	56	56	56	56	56
RUM	7.62 cm Pak 36(r) L/51.2	76.2mmL51.2	HEATi	Gr. 38 HL/C	710	75	75	75	75	75	75	75	75	75	75
RUM	8,8 cm Flak 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
RUM	8,8 cm Flak 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
RUM	8,8 cm Flak 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
RUM	8,8 cm Flak 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
RUM	10,5 cm Geb.H.40 L/27.3	105mmL27.3	HEAT	Gr.39 HL/A	-	60	60	60	60	60	60	60	60	60	60
RUM	10,5 cm leFH 18 L/28	105mmL28	APCBC	-	395	63	61	59	57	54	52	50	48	46	38
RUM	10,5 cm leFH 18 L/28	105mmL28	APHE	-	495	56	54	52	50	48	47	45	43	41	34
RUM	10,5 cm leFH 18 L/28	105mmL28	HEAT	Gr.39 Hl	-	52	52	52	52	52	52	52	52	52	52
RUM	Panzerwurfmine	114mmATGr	HEAT	-	-	66	66	66	66	66	66	66	66	66	66
RUM	152 mm M1910/34 Gun	152mmL32	APHE	Naval 1915/28	-	73	72	71	69	67	66	64	62	60	54
RUM	Tellermine	318mmATGr	HEAT	-	-	119	119	119	119	119	119	119	119	119	119
HUN	7.92 mm Maschinengewehr 34	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
HUN	Solothurn 1930	7.92mmLMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
HUN	20 mm Danuviánál 36M ATR	20mmATR	AP		856	20	17	13	10	6	3	0	0	0	0
HUN	20 mm QF 36M Solothurn ATR	20mmATR	AP		870	20	17	13	10	6	3	0	0	0	0
HUN	37 mm Bofors	37mmL45	AP	-	870	40	37	33	27	20	18	15	11	7	0
HUN	37 mm Bofors	37mmL45	APHE	-	-	35	32	29	26	22	21	20	18	15	5
HUN	3,7 cm KwK 38(t) L/47.8	37mmL47.8	APCR	Pzgr 40	750	64	49	33	18	2	1	0	0	0	0
HUN	3,7 cm KwK 38(t) L/47.8	37mmL47.8	APCBC	Pzgr. (t) umg.	741	41	37	33	30	27	26	24	21	18	7
HUN	3,7 cm KwK 38(t) L/47.8	37mmL47.8	AP	Pzgr. (t)	-	36	34	31	28	24	23	22	20	17	8
HUN	40 mm 37/42 M. L/45 Gun	40mmL45	AP		792	49	43	37	32	27	22	17	12	6	0
HUN	40 mm Škoda A17	40mmL51	APC		900	55	51	47	42	37	32	27	22	18	0

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
HUN	40 mm Bofors gun	40mmL60	AP		881	55	51	47	42	37	32	27	22	18	0
HUN	40 mm Bofors gun (x2)	2x40mmL60	AP		881	55	51	47	42	37	32	27	22	18	0
HUN	5 cm KwK 38 L/42	50mmL42	APCR	-	685	94	75	55	38	21	11	0	0	0	0
HUN	5 cm KwK 38 L/42	50mmL42	APC	-	685	55	51	47	42	37	33	28	24	19	1
HUN	5 cm KwK 38 L/42	50mmL42	AP	-		53	48	43	38	32	28	24	19	14	0
HUN	5 cm KwK 39 L/60	50mmL60	APCR	-	823	130	101	72	55	38	19	0	0	0	0
HUN	5 cm KwK 39 L/60	50mmL60	APC	-	835	72	67	61	56	50	45	39	34	28	6
HUN	5 cm KwK 39 L/60	50mmL60	AP	Pzgr	550	67	62	57	51	44	39	34	29	23	1
HUN	5 cm KwK 39 L/60	50mmL60	HEAT	Steil.Gr.42	-	37	37	37	37	37	37	37	37	37	37
HUN	75 mm 41M 75/25	75mmL21	AP			42	40	38	36	34	31	28	25	23	12
HUN	7,5 cm KwK 37 L/24	75mmL24	AP	PzGr. 39/43	395	56	54	51	48	45	42	40	37	34	23
HUN	7,5 cm KwK 37 L/24	75mmL24	APHE	Gr.38 Hl	280	41	40	39	37	35	34	33	32	30	25
HUN	7,5 cm KwK 37 L/24	75mmL24	HEAT	Gr.38 Hl/A/B	280	60	60	60	60	60	60	60	60	60	60
HUN	7,5 cm KwK 37 L/24	75mmL24	HEATi	Gr.38 Hl/C	280	86	86	86	86	86	86	86	86	86	86
HUN	7,5 cm le F.K.18 L/26	75mmL26	HEAT	Gr.38 Hl/A/B	380	52	52	52	52	52	52	52	52	52	52
HUN	7,5 cm le F.K.18 L/26	75mmL26	HEATi	Gr.38 Hl/C	-	86	86	86	86	86	86	86	86	86	86
HUN	7,5 cm StuK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
HUN	7,5 cm StuK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
HUN	7,5 cm StuK 40 L/43	75mmL43	AP	-	450	90	86	81	77	72	68	63	59	54	36
HUN	7,5 cm StuK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	550	56	56	56	56	56	56	56	56	56	56
HUN	7,5 cm KwK 40 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
HUN	7,5 cm KwK 40 L/48	75mmL48	APCBC	-	450	106	101	96	91	85	80	74	69	64	43
HUN	7,5 cm KwK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
HUN	7,5 cm KwK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
HUN	7,5 cm Pak 39 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
HUN	7,5 cm Pak 39 L/48	75mmL48	APCBC	-	450	106	101	96	91	85	80	74	69	64	43
HUN	7,5 cm Pak 39 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
HUN	7,5 cm Pak 39 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
HUN	8,8 cm Flak 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
HUN	8,8 cm Flak 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
HUN	8,8 cm Flak 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
HUN	8,8 cm Flak 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
HUN	8,8 cm KwK 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
HUN	8,8 cm KwK 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
HUN	8,8 cm KwK 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
HUN	8,8 cm KwK 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
HUN	105 mm MÁVAG 40/43M L20.5 howitzer	105mmL20.5	AP			63	61	59	57	54	52	50	48	46	38
HUN	10,5 cm leFH 18 L/28	105mmL28	APCBC	-	395	63	61	59	57	54	52	50	48	46	38
HUN	10,5 cm leFH 18 L/28	105mmL28	APHE	-	495	56	54	52	50	48	47	45	43	41	34
HUN	10,5 cm leFH 18 L/28	105mmL28	HEAT	Gr.39 Hl	-	52	52	52	52	52	52	52	52	52	52
HUN	Panzerwurfmine	114mmATGr	HEAT	-	-	66	66	66	66	66	66	66	66	66	66
HUN	15 cm s F.H.18 L/30	150mmL30	HEAT	Gr.39 Hl	-	119	119	119	119	119	119	119	119	119	119
HUN	15 cm s F.H.18/40 L/32.8	150mmL32.8	HEAT	Gr.39 Hl	-	119	119	119	119	119	119	119	119	119	119
HUN	152 mm ML-20S gun-how M1937	152mmL29	APBC	-	655	100	97	95	92	90	88	86	84	82	72
HUN	152 mm ML-20S gun-how M1937	152mmL29	APHE	-	560	100	97	95	92	90	88	86	84	82	72
HUN	152 mm ML-20S gun-how M1937	152mmL29	HEAT	BP-540	680	93	93	93	93	93	93	93	93	93	93
HUN	152 mm ML-20S gun-how M1937	152mmL29	HEATi	BP-540C	-	187	187	187	187	187	187	187	187	187	187
HUN	Tellermine	318mmATGr	HEAT	-	-	119	119	119	119	119	119	119	119	119	119
BUL	6.5 mm Breda M30 MG (x2)	2x6.5mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
BUL	7.92 mm Maschinengewehr 34	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
BUL	Solothurn 1930	7.92mmLMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
BUL	2 cm KwK 30 L/55	20mmL55	AP	Pzgr	950	20	17	14	11	8	5	2	1	0	0
BUL	25 mm A/T gun SA 34	25mmL72	AP	-	-	35	33	30	25	20	16	13	9	5	0
BUL	37 mm Puteaux SA 18	37mmL21	APC	-	600	31	25	18	15	11	8	4	2	0	0
BUL	37 mm Puteaux SA 18	37mmL21	AP	-	388	29	25	21	17	13	9	5	3	0	0
BUL	37 mm Puteaux SA 18	37mmL21	APHE	-	-	12	10	8	6	4	2	0	0	0	0

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
BUL	37.2 mm ÚV vz. 34 gun L/40	37mmL37	AP	-	-	35	33	30	27	23	22	21	19	16	7
BUL	3,7 cm KwK 38(t) L/47.8	37mmL47.8	APCR	Pzgr 40	750	64	49	33	18	2	1	0	0	0	0
BUL	3,7 cm KwK 38(t) L/47.8	37mmL47.8	APCBC	Pzgr. (t) umg.	741	41	37	33	30	27	26	24	21	18	7
BUL	3,7 cm KwK 38(t) L/47.8	37mmL47.8	AP	Pzgr. (t)	-	36	34	31	28	24	23	22	20	17	8
BUL	37 mm Bofors AA Cannon	37mmL54	AP	-	870	40	37	33	27	20	18	15	11	7	0
BUL	37 mm Bofors AA Cannon	37mmL54	APHE	-	870	36	34	31	28	25	22	19	16	14	2
BUL	QF 3 pounder Hotchkiss	47mmL40	APHE	-	-	55	51	48	45	41	38	35	32	29	16
BUL	5 cm Pak 38 L/60	50mmL60	APCR	-	823	130	101	72	55	38	19	0	0	0	0
BUL	5 cm Pak 38 L/60	50mmL60	APC	-	835	72	67	61	56	50	45	39	34	28	6
BUL	5 cm Pak 38 L/60	50mmL60	AP	Pzgr	550	67	62	57	51	44	39	34	29	23	1
BUL	5 cm Pak 38 L/60	50mmL60	HEAT	Steil.Gr.42	-	37	37	37	37	37	37	37	37	37	37
BUL	7,5 cm KwK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
BUL	7,5 cm KwK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
BUL	7,5 cm KwK 40 L/43	75mmL43	AP	-	450	90	86	81	77	72	68	63	59	54	36
BUL	7,5 cm KwK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	550	56	56	56	56	56	56	56	56	56	56
BUL	7,5 cm StuK 40 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
BUL	7,5 cm StuK 40 L/48	75mmL48	APCBC	-	680	106	101	96	91	85	80	74	69	64	43
BUL	7,5 cm StuK 40 L/48	75mmL48	AP	-	450	90	86	81	77	72	68	63	59	54	36
BUL	7,5 cm StuK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
BUL	7,5 cm StuK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
BUL	8,8 cm Flak 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
BUL	8,8 cm Flak 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
BUL	8,8 cm Flak 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
BUL	8,8 cm Flak 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
BUL	10,5 cm leFH 18 L/28	105mmL28	APCBC	-	395	63	61	59	57	54	52	50	48	46	38
BUL	10,5 cm leFH 18 L/28	105mmL28	APHE	-	495	56	54	52	50	48	47	45	43	41	34
BUL	10,5 cm leFH 18 L/28	105mmL28	HEAT	Gr.39 HI	-	52	52	52	52	52	52	52	52	52	52
BUL	Panzerwurfmine	114mmATGr	HEAT	-	-	66	66	66	66	66	66	66	66	66	66
BUL	Tellermine	318mmATGr	HEAT	-	-	119	119	119	119	119	119	119	119	119	119
FIN	7.62 mm DT machine gun	7.62mmMG	AP		-	8	6	4	2	0	0	0	0	0	0
FIN	7.62 mm DT machine gun	7.62mmLMG	AP	-	823	8	6	4	2	0	0	0	0	0	0
FIN	7.62 mm DT Machine Gun (x2)	2x7.62mmMG	AP		785	8	6	4	2	0	0	0	0	0	0
FIN	7.62 mm DT machine gun	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
FIN	7.62 mm DT machine gun (x2)	2x7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
FIN	.303 Maxim machine gun (x4)	4x7.92mmMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
FIN	12.7 mm DShK heavy machine gun	12.7mmHMG	AP	-	785	12	10	7	4	1	1	0	0	0	0
FIN	13.2 mm Hotchkiss machine gun	13.2mmHMG	AP	-	1050	11	10	9	8	7	6	5	4	3	0
FIN	2 cm FlaK 38 L/65	20mmL65	APCR	Pzgr 40	780	40	30	20	10	0	0	0	0	0	0
FIN	2 cm FlaK 38 L/65	20mmL65	AP	-	950	20	17	14	12	9	6	4	2	0	0
FIN	25 mm A/T gun SA 34	25mmL72	AP	-	-	35	33	30	25	20	16	13	9	5	0
FIN	37 mm PS2 Hotchkiss	37mmL22.8	AP		442	22	18	14	10	6	3	0	0	0	0
FIN	37 mm PS2 Hotchkiss	37mmL22.8	APHE		-	22	20	17	14	11	8	5	3	0	0
FIN	37 mm Bofors	37mmL45	AP	-	870	40	37	33	27	20	18	15	11	7	0
FIN	37 mm Bofors	37mmL45	APHE	-	-	35	32	29	26	22	21	20	18	15	5
FIN	37 mm Bofors L/54	37mmL54	AP	-	870	40	37	33	27	20	18	15	11	7	0
FIN	37 mm Bofors L/54	37mmL54	APHE	-	870	36	34	31	28	25	22	19	16	14	2
FIN	40 mm Bofors gun	40mmL60	AP	-	-	55	51	47	42	37	32	27	22	18	0
FIN	45 mm 20-K M1932	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
FIN	45 mm 20-K M1932	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
FIN	45 mm 20-K M1932	45mmL46	APBC	BRZ-240	-	53	46	38	31	23	16	8	4	0	0
FIN	45 mm 53-K M1938	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
FIN	45 mm 53-K M1938	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
FIN	45 mm 53-K M1938	45mmL46	APBC	BRZ-240	-	53	46	38	31	23	16	8	4	0	0
FIN	45 mm M-42 M1942	45mmL66.2	APCR	BR-240P	870	76	56	36	18	0	0	0	0	0	0
FIN	45 mm M-42 M1942	45mmL66.2	APCBC	-	870	65	61	57	53	49	45	41	37	33	18
FIN	45 mm M-42 M1942	45mmL66.2	APBC	BRZ-240	870	70	61	52	43	34	25	16	8	0	0

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
FIN	45 mm M-42 M1942	45mmL66.2	AP	-	-	60	56	52	48	44	40	36	32	28	12
FIN	47 mm L/36	47mmL36	AP	-	-	39	36	33	30	26	23	20	17	14	1
FIN	QF 3 pounder Hotchkiss	47mmL40	APHE	-	-	55	51	48	45	41	38	35	32	29	16
FIN	5 cm Pak 38 L/60	50mmL60	APCR	-	823	130	101	72	55	38	19	0	0	0	0
FIN	5 cm Pak 38 L/60	50mmL60	APC	-	835	72	67	61	56	50	45	39	34	28	6
FIN	5 cm Pak 38 L/60	50mmL60	AP	Pzgr	550	67	62	57	51	44	39	34	29	23	1
FIN	5 cm Pak 38 L/60	50mmL60	HEAT	Steil.Gr.42	-	37	37	37	37	37	37	37	37	37	37
FIN	75 mm gun M97/33	75mmL30	AP	-	575	58	54	50	46	42	38	34	30	26	10
FIN	75 mm gun M97/33	75mmL30	APHE	-	-	53	46	40	37	34	31	29	26	23	12
FIN	7,5 cm F.K.38 L/34	75mmL34	HEAT	Gr.38 HL/B	605	56	56	56	56	56	56	56	56	56	56
FIN	7,5 cm StuK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
FIN	7,5 cm StuK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
FIN	7,5 cm StuK 40 L/43	75mmL43	AP	-	450	90	86	81	77	72	68	63	59	54	36
FIN	7,5 cm StuK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	550	56	56	56	56	56	56	56	56	56	56
FIN	7,5 cm PaK 40 L/46	75mmL46	APCR	-	750	143	132	120	109	97	87	77	66	55	11
FIN	7,5 cm PaK 40 L/46	75mmL46	APCBC	-	450	100	95	90	85	79	74	68	63	58	37
FIN	7,5 cm PaK 40 L/46	75mmL46	HEAT	-	-	56	56	56	56	56	56	56	56	56	56
FIN	7,5 cm KwK 40 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
FIN	7,5 cm KwK 40 L/48	75mmL48	APCBC	-	450	106	101	96	91	85	80	74	69	64	43
FIN	7,5 cm KwK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
FIN	7,5 cm KwK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
FIN	7,5 cm StuK 40 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
FIN	7,5 cm StuK 40 L/48	75mmL48	APCBC	-	680	106	101	96	91	85	80	74	69	64	43
FIN	7,5 cm StuK 40 L/48	75mmL48	AP	-	450	90	86	81	77	72	68	63	59	54	36
FIN	7,5 cm StuK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
FIN	7,5 cm StuK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
FIN	76.2 mm KT-28	76.2mmL16.4	APHE	-	-	26	25	23	22	21	19	18	16	15	9
FIN	76.2 mm OB-25 M1943	76.2mmL16.4	APHE	-	-	26	25	23	22	21	19	18	16	15	9
FIN	76.2 mm L-10	76.2mmL23.7	APHE	-	610	57	51	46	41	37	32	26	21	15	0
FIN	76.2 mm L-10	76.2mmL23.7	HEAT	BR-353A	325	56	56	56	56	56	56	56	56	56	56
FIN	76.2 mm L-10	76.2mmL23.7	HEATi	BR-353C	-	90	90	90	90	90	90	90	90	90	90
FIN	76.2 mm M1902/1930	76.2mmL30	APHE	-	-	68	64	60	56	52	48	44	40	36	20
FIN	76.2 mm L-11	76.2mmL30.5	APBC	-	612	53	49	45	42	39	35	31	27	23	7
FIN	76.2 mm L-11	76.2mmL30.5	APHE	BR-350A	610	54	50	46	44	42	40	37	35	33	18
FIN	76.2 mm L-11	76.2mmL30.5	HEAT	BR-353A	325	56	56	56	56	56	56	56	56	56	56
FIN	76.2 mm L-11	76.2mmL30.5	HEATi	BR-353C	610	90	90	90	90	90	90	90	90	90	90
FIN	76.2 mm F-34 M1940	76.2mmL41.5	APCR	BR-350P	612	101	85	69	57	45	29	13	6	0	0
FIN	76.2 mm F-34 M1940	76.2mmL41.5	APCBC	-	612	55	51	47	43	39	35	31	27	23	8
FIN	76.2 mm F-34 M1940	76.2mmL41.5	AP	-	612	51	48	45	42	39	35	31	27	23	7
FIN	76.2 mm F-34 M1940	76.2mmL41.5	APBC	-	655	53	49	45	42	39	35	31	27	23	7
FIN	76.2 mm F-34 M1940	76.2mmL41.5	APHE	BR-350A	680	66	59	51	48	45	43	40	38	36	16
FIN	76.2 mm F-34 M1940	76.2mmL41.5	HEAT	BR-353A	325	56	56	56	56	56	56	56	56	56	56
FIN	76.2 mm F-34 M1940	76.2mmL41.5	HEATi	BR-353C	680	90	90	90	90	90	90	90	90	90	90
FIN	76.2 mm F-22 M1936	76.2mmL51.2	APCR	Pzgr 40	740	152	135	118	105	92	82	71	63	55	7
FIN	76.2 mm F-22 M1936	76.2mmL51.2	APCBC	Pzgr.39 rot	450	108	103	98	93	88	84	79	75	71	53
FIN	76.2 mm F-22 M1936	76.2mmL51.2	HEAT	Gr. 38 HL/B	450	56	56	56	56	56	56	56	56	56	56
FIN	76.2 mm F-22 M1936	76.2mmL51.2	HEATi	Gr. 38 HL/C	710	75	75	75	75	75	75	75	75	75	75
FIN	85 mm ZiS-53	85mmL53.9	APCR	BR-365	792	97	94	90	88	85	80	75	73	70	57
FIN	85 mm ZiS-53	85mmL53.9	APCBC	-	792	103	99	94	90	86	82	77	71	64	45
FIN	85 mm ZiS-53	85mmL53.9	APBC	BR-365	-	97	94	90	88	85	80	75	73	70	57
FIN	8,8 cm Flak 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
FIN	8,8 cm Flak 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
FIN	8,8 cm Flak 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
FIN	8,8 cm Flak 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
FIN	10,5 cm leFH 18 L/28	105mmL28	APCBC	-	395	63	61	59	57	54	52	50	48	46	38
FIN	10,5 cm leFH 18 L/28	105mmL28	APHE	-	495	56	54	52	50	48	47	45	43	41	34

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
FIN	10,5 cm leFH 18 L/28	105mmL28	HEAT	Gr.39 Hl	-	52	52	52	52	52	52	52	52	52	52
FIN	Panzerwurfmine	114mmATGr	HEAT	-	-	66	66	66	66	66	66	66	66	66	66
FIN	122 mm M-30 how M1938	122mmL22	HEAT	-	-	149	149	149	149	149	149	149	149	149	149
FIN	122 mm M-30S how M1938	122mmL22	HEAT	-	-	149	149	149	149	149	149	149	149	149	149
FIN	15 cm sIG 33 L/11	150mmL11	APHE	-	240	32	29	26	24	21	18	15	12	9	0
FIN	15 cm sIG 33 L/11	150mmL11	HEAT	Gr.39 HL/A	240	119	119	119	119	119	119	119	119	119	119
FIN	15 cm s F.H.18 L/30	150mmL30	HEAT	Gr.39 Hl	-	119	119	119	119	119	119	119	119	119	119
FIN	15 cm s F.H.18M L/32.4	150mmL32.4	HEAT	Gr.39 Hl	-	119	119	119	119	119	119	119	119	119	119
FIN	15 cm s F.H.18/40 L/32.8	150mmL32.8	HEAT	Gr.39 Hl	-	119	119	119	119	119	119	119	119	119	119
FIN	152 mm M-10 how M1938	152mmL20	APHE	Naval 1915/28	560	73	72	71	69	67	66	64	62	60	54
FIN	152 mm M-10 how M1938	152mmL20	HEAT	BP-540	-	93	93	93	93	93	93	93	93	93	93
FIN	152 mm ML-20 gun-how M1937	152mmL29	APBC	-	655	100	97	95	92	90	88	86	84	82	72
FIN	152 mm ML-20 gun-how M1937	152mmL29	APHE	-	560	100	97	95	92	90	88	86	84	82	72
FIN	152 mm ML-20 gun-how M1937	152mmL29	HEAT	BP-540	560	93	93	93	93	93	93	93	93	93	93
FIN	152 mm ML-20 gun-how M1937	152mmL29	HEATi	BP-540i	-	187	187	187	187	187	187	187	187	187	187
FIN	152 mm ML-20S gun-how M1937	152mmL29	APBC	-	655	100	97	95	92	90	88	86	84	82	72
FIN	152 mm ML-20S gun-how M1937	152mmL29	APHE	-	560	100	97	95	92	90	88	86	84	82	72
FIN	152 mm ML-20S gun-how M1937	152mmL29	HEAT	BP-540	560	93	93	93	93	93	93	93	93	93	93
FIN	152 mm ML-20S gun-how M1937	152mmL29	HEATi	BP-540i	-	187	187	187	187	187	187	187	187	187	187
FIN	152 mm M1910/34 Gun	152mmL32	APHE	Naval 1915/28	-	73	72	71	69	67	66	64	62	60	54
FIN	Tellermine	318mmATGr	HEAT	-	-	119	119	119	119	119	119	119	119	119	119
SLV	7.92 mm Schwarzlose MG vz. 07/24	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
SLV	7.92 mm ZB vz. 26 LMG	7.92mmLMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
SLV	7.92 mm ZB vz. 26 machine gun (x2)	2x7.92mmMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
SLV	2 cm KwK 30 L/55	20mmL55	AP	Pzgr	675	20	17	14	11	8	5	2	1	0	0
SLV	37.2 mm ÚV vz. 34 gun L/40	37mmL37	AP	-	-	35	33	30	27	23	22	21	19	16	7
SLV	37 mm Bofors	37mmL45	AP	-	870	40	37	33	27	20	18	15	11	7	0
SLV	37 mm Bofors	37mmL45	APHE	-	-	35	32	29	26	22	21	20	18	15	5
SLV	3,7 cm KwK 38(t) L/47.8	37mmL47.8	APCR	Pzgr 40	750	64	49	33	18	2	1	0	0	0	0
SLV	3,7 cm KwK 38(t) L/47.8	37mmL47.8	APCBC	Pzgr. (t) umg.	741	41	37	33	30	27	26	24	21	18	7
SLV	3,7 cm KwK 38(t) L/47.8	37mmL47.8	AP	Pzgr. (t)	-	36	34	31	28	24	23	22	20	17	8
SLV	45 mm 19-K M1932	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
SLV	45 mm 19-K M1932	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
SLV	45 mm 19-K M1932	45mmL46	APBC	BRZ-240	-	53	46	38	31	23	16	8	4	0	0
SLV	45 mm 20-K M1932	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
SLV	45 mm 20-K M1932	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
SLV	45 mm 20-K M1932	45mmL46	APBC	BRZ-240	-	53	46	38	31	23	16	8	4	0	0
SLV	5 cm Pak 38 L/60	50mmL60	APCR	-	823	130	101	72	55	38	19	0	0	0	0
SLV	5 cm Pak 38 L/60	50mmL60	APC	-	835	72	67	61	56	50	45	39	34	28	6
SLV	5 cm Pak 38 L/60	50mmL60	AP	Pzgr	550	67	62	57	51	44	39	34	29	23	1
SLV	5 cm Pak 38 L/60	50mmL60	HEAT	Steil.Gr.42	-	37	37	37	37	37	37	37	37	37	37
SLV	7,5 cm KwK 37 L/24	75mmL24	AP	PzGr. 39/43	395	56	54	51	48	45	42	40	37	34	23
SLV	7,5 cm KwK 37 L/24	75mmL24	APHE	Gr.38 Hl	280	41	40	39	37	35	34	33	32	30	25
SLV	7,5 cm KwK 37 L/24	75mmL24	HEAT	Gr.38 Hl/A/B	280	60	60	60	60	60	60	60	60	60	60
SLV	7,5 cm KwK 37 L/24	75mmL24	HEATi	Gr.38 Hl/C	280	86	86	86	86	86	86	86	86	86	86
SLV	7,5 cm StuK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
SLV	7,5 cm StuK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
SLV	7,5 cm StuK 40 L/43	75mmL43	AP	-	450	90	86	81	77	72	68	63	59	54	36
SLV	7,5 cm StuK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	550	56	56	56	56	56	56	56	56	56	56
SLV	7,5 cm PaK 40 L/46	75mmL46	APCR	-	750	143	132	120	109	97	87	77	66	55	11
SLV	7,5 cm PaK 40 L/46	75mmL46	APCBC	-	450	100	95	90	85	79	74	68	63	58	37
SLV	7,5 cm PaK 40 L/46	75mmL46	HEAT	-	-	56	56	56	56	56	56	56	56	56	56
SLV	76.2 mm M1902/1930 (L40)	76.2mmL40	APHE	BR-350A	-	65	62	59	55	51	47	43	41	39	26
SLV	8,8 cm Flak 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
SLV	8,8 cm Flak 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
SLV	8,8 cm Flak 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
SLV	8,8 cm Flak 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
SLV	10,5 cm leFH 18 L/28	105mmL28	APCBC	-	395	63	61	59	57	54	52	50	48	46	38
SLV	10,5 cm leFH 18 L/28	105mmL28	APHE	-	495	56	54	52	50	48	47	45	43	41	34
SLV	10,5 cm leFH 18 L/28	105mmL28	HEAT	Gr.39 Hl	-	52	52	52	52	52	52	52	52	52	52
SLV	Panzerwurfmine	114mmATGr	HEAT	-	-	66	66	66	66	66	66	66	66	66	66
SLV	Tellermine	318mmATGr	HEAT	-	-	119	119	119	119	119	119	119	119	119	119
CRO	6.5 mm Breda M30 MG (x2)	2x6.5mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
CRO	7.92 mm wz. 25 Hotchkiss machine gun	7.92mmMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
CRO	7.92 mm Maschinengewehr 34	7.92mmLMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
CRO	7.92 mm MG13 machine guns (x2)	2x7.92mmMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
CRO	20/65 Breda 35 autocannon	20mmL65	AP	-	820	33	29	25	21	17	13	9	5	1	0
CRO	20 mm wz.38 model A (FK-A)	20mmL73	AP	-	600	20	17	13	10	6	3	0	0	0	0
CRO	37 mm Puteaux SA 18	37mmL21	APC	-	600	31	25	18	15	11	8	4	2	0	0
CRO	37 mm Puteaux SA 18	37mmL21	AP	-	388	29	25	21	17	13	9	5	3	0	0
CRO	37 mm Puteaux SA 18	37mmL21	APHE	-	-	12	10	8	6	4	2	0	0	0	0
CRO	37 mm Puteaux SA 38	37mmL33	APC	-	705	29	26	23	20	16	14	12	9	6	0
CRO	37 mm Puteaux SA 38	37mmL33	AP	-	-	37	33	29	25	21	17	13	9	5	0
CRO	2 pounder gun	40mmL50	APCBC	-	792	65	61	58	54	50	46	42	38	34	18
CRO	2 pounder gun	40mmL50	APC	-	792	55	51	47	42	37	32	27	22	18	0
CRO	2 pounder gun	40mmL50	AP	-	1280	49	43	37	32	27	22	17	12	6	0
CRO	2 pounder gun	40mmL50	APCNR	-	660	139	129	119	109	99	89	79	69	59	19
CRO	47 mm Cannone da 47/32 M35	47mmL32	APC	0	630	46	43	39	36	32	29	25	22	18	4
CRO	47 mm Cannone da 47/32 M35	47mmL32	AP		-	43	38	32	28	24	17	11	5	0	0
CRO	47 mm Cannone da 47/32 M35	47mmL32	APC	0	630	46	43	39	36	32	29	25	22	18	4
CRO	47 mm Cannone da 47/32 M35	47mmL32	AP		-	43	38	32	28	24	17	11	5	0	0
CRO	canon de 47 mm SA 35	47mmL32	APC	0	630	46	43	39	36	32	29	25	22	18	4
CRO	canon de 47 mm SA 35	47mmL32	AP		-	43	38	32	28	24	17	11	5	0	0
CRO	47 mm L/34	47mmL34	AP	-	-	58	51	43	38	32	26	19	13	6	0
CRO	47 mm L/36	47mmL36	AP	-	-	39	36	33	30	26	23	20	17	14	1
CRO	4,7 cm KPÚV vz. 36 L/43	47mmL43	APC	-	1080	54	51	48	45	41	38	35	32	29	16
CRO	4,7 cm KPÚV vz. 36 L/43	47mmL43	APCR	-	785	100	80	59	39	18	9	0	0	0	0
CRO	4,7 cm KPÚV vz. 36 L/43	47mmL43	AP	-	-	55	51	48	45	41	38	35	32	29	16
CRO	7,5 cm le I.G.18 L/12	75mmL12	HEAT	-	260	34	34	34	34	34	34	34	34	34	34
CRO	7,5 cm le I.G.18 L/12	75mmL12	HEATi	-	-	72	72	72	72	72	72	72	72	72	72
CRO	7,5 cm KwK 37 L/24	75mmL24	AP	PzGr. 39/43	395	56	54	51	48	45	42	40	37	34	23
CRO	7,5 cm KwK 37 L/24	75mmL24	APHE	Gr.38 Hl	280	41	40	39	37	35	34	33	32	30	25
CRO	7,5 cm KwK 37 L/24	75mmL24	HEAT	Gr.38 Hl/A/B	280	60	60	60	60	60	60	60	60	60	60
CRO	7,5 cm KwK 37 L/24	75mmL24	HEATi	Gr.38 Hl/C	280	86	86	86	86	86	86	86	86	86	86
CRO	7,5 cm KwK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
CRO	7,5 cm KwK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
CRO	7,5 cm KwK 40 L/43	75mmL43	AP	-	450	90	86	81	77	72	68	63	59	54	36
CRO	7,5 cm KwK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	550	56	56	56	56	56	56	56	56	56	56
CRO	7,5 cm StuK 40 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
CRO	7,5 cm StuK 40 L/48	75mmL48	APCBC	-	680	106	101	96	91	85	80	74	69	64	43
CRO	7,5 cm StuK 40 L/48	75mmL48	AP	-	450	90	86	81	77	72	68	63	59	54	36
CRO	7,5 cm StuK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
CRO	7,5 cm StuK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
CRO	Cannone da 90/53	90mmL52.6	AP	-	732	160	150	140	130	120	110	100	90	80	40
CRO	Panzerwurfmine	114mmATGr	HEAT	-	-	66	66	66	66	66	66	66	66	66	66
CRO	Tellermine	318mmATGr	HEAT	-	-	119	119	119	119	119	119	119	119	119	119
JP	6.5 mm Type 91 machine gun	6.5mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
JP	7.7 mm Type 97 machine gun	7.7mmMG	AP		730	8	6	4	2	0	0	0	0	0	0
JP	Type 99 LMG	7.7mmLMG	AP	-	730	8	6	4	2	0	0	0	0	0	0
JP	20 mm Type 97 ATR	20mmATR	AP	-	820	8	6	4	2	0	0	0	0	0	0
JP	20 mm Type 98 AA MC L/70	20mmL70	AP	-	820	20	17	13	10	6	3	0	0	0	0
JP	20 mm Type 98 AA MC L/70 (x2)	2x20mmL70	AP	-	451	20	17	13	10	6	3	0	0	0	0

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
JP	37 mm Type 100 gun	37mmL36.7	AP		700	33	29	25	21	17	13	9	5	1	0
JP	37 mm Type 100 gun	37mmL36.7	APHE		400	30	27	24	21	19	16	13	10	7	0
JP	37 mm Type 100 gun	37mmL36.7	HEAT	-	700	0	0	0	0	0	0	0	0	0	0
JP	37 mm Type 98 gun	37mmL36.7	AP		700	33	29	25	21	17	13	9	5	1	0
JP	37 mm Type 98 gun	37mmL36.7	APHE		400	30	27	24	21	19	16	13	10	7	0
JP	37 mm Type 98 gun	37mmL36.7	HEAT	-	700	0	0	0	0	0	0	0	0	0	0
JP	37 mm Type 97 Ra A/T gun L/45	37mmL45	AP	Pzgr	400	35	32	29	26	22	21	20	18	15	5
JP	37 mm Type 97 Ra A/T gun L/45	37mmL45	HEAT	-	700	0	0	0	0	0	0	0	0	0	0
JP	37 mm Type 94 gun	37mmL47.7	AP		400	30	26	22	19	15	10	5	2	0	0
JP	37 mm Type 94 gun	37mmL47.7	HEAT	-	700	28	28	28	28	28	28	28	28	28	28
JP	37 mm Type 1 gun	37mmL50	AP		400	35	30	25	20	15	10	5	3	0	0
JP	37 mm Type 1 gun	37mmL50	HEAT	-	780	0	0	0	0	0	0	0	0	0	0
JP	47 mm Type 97 (E) A/T gun L/48	47mmL48	AP	Type 4 AP	730	59	55	51	47	43	39	35	31	27	11
JP	47 mm Type 97 (E) A/T gun L/48	47mmL48	APHE	Type 1 APHE	400	54	51	48	45	42	39	37	34	31	19
JP	47 mm Type 97 (E) A/T gun L/48	47mmL48	HEAT	-	730	0	0	0	0	0	0	0	0	0	0
JP	47 mm Type 1 A/T gun L/53.7	47mmL53.7	AP	Type 4 AP	830	55	51	48	45	41	38	35	32	29	16
JP	47 mm Type 1 A/T gun L/53.7	47mmL53.7	APHE	Type 1 APHE	400	50	50	51	48	45	38	30	27	24	13
JP	47 mm Type 1 A/T gun L/53.7	47mmL53.7	HEAT	-	830	0	0	0	0	0	0	0	0	0	0
JP	57 mm Type 90 gun	57mmL14.9	AP		380	28	24	20	16	12	8	4	2	0	0
JP	57 mm Type 90 gun	57mmL14.9	HEAT		380	41	41	41	41	41	41	41	41	41	41
JP	57 mm Type 97 gun L/18.4	57mmL18.4	AP		355	41	37	33	29	25	21	17	13	9	0
JP	57 mm Type 97 gun L/18.4	57mmL18.4	HEAT		355	41	41	41	41	41	41	41	41	41	41
JP	75 mm Type 99 gun	75mmL19	AP	Type 1 AP	435	48	44	40	36	32	28	24	20	16	0
JP	75 mm Type 99 gun	75mmL19	HEAT	Type 2 HEAT	435	75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 41 gun L/19.2	75mmL19.2	HEAT	Type 2 HEAT	435	75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 94 gun L/20.8	75mmL20.8	HEAT	Type 2 HEAT		75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 41 gun L/29.3	75mmL29.3	HEAT	Type 2 HEAT	683	75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 95 gun L/30.67	75mmL30.7	AP	Type 1 AP	435	58	54	50	46	42	38	34	30	26	10
JP	75 mm Type 95 gun L/30.67	75mmL30.7	HEAT	Type 2 HEAT	500	75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 38 gun L/31	75mmL31	AP	Type 1 AP	435	67	64	60	57	53	50	46	42	38	23
JP	75 mm Type 38 gun L/31	75mmL31	HEAT	Type 2 HEAT	510	75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 90 gun L/38.4	75mmL38.4	AP	Type 1 AP	435	87	82	76	70	63	57	51	47	43	21
JP	75 mm Type 90 gun L/38.4	75mmL38.4	HEAT	Type 2 HEAT	683	75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 3 gun	75mmL44	AP	Type 1 AP	435	67	63	58	54	49	45	40	36	31	13
JP	75 mm Type 3 gun	75mmL44	HEAT	Type 2 HEAT	680	75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 90 gun	75mmL44	AP	Type 1 AP	435	67	63	58	54	49	45	40	36	31	13
JP	75 mm Type 90 gun	75mmL44	HEAT	Type 2 HEAT	680	75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 4 A/A gun L/56.4	75mmL56.4	AP	Type 1 AP	435	68	65	62	59	56	52	48	44	40	24
JP	75 mm Type 4 A/A gun L/56.4	75mmL56.4	HEAT	Type 2 HEAT	435	75	75	75	75	75	75	75	75	75	75
JP	75 mm Type 5 gun L/56.4	75mmL56.4	AP	Type 1 AP	435	68	65	62	59	56	52	48	44	40	24
JP	75 mm Type 5 gun L/56.4	75mmL56.4	HEAT	Type 2 HEAT	435	75	75	75	75	75	75	75	75	75	75
JP	Type 3 AT Grenade	100mmATGr	HEAT	-	334	75	75	75	75	75	75	75	75	75	75
JP	10 cm Type 99 Mtn gun L/12.4	105mmL12.4	APHE	-	334	56	54	52	50	48	47	45	43	41	34
JP	105 mm Type 91 howitzer	105mmL24	AP		546	63	61	59	57	54	52	50	48	46	38
JP	10 cm Type 92 Cannon L/45	105mmL45	AP		760	56	54	52	50	48	47	45	43	41	34
JP	15 cm Type 89 Cannon L/40.2	150mmL40.2	APHE		875	56	54	52	50	48	47	45	43	41	34
RU	7.62 mm DT machine gun	7.62mmMG	AP	-	490	8	6	4	2	0	0	0	0	0	0
RU	Degtyaryov DP-28 LMG	7.62mmLMG	AP	-	823	8	6	4	2	0	0	0	0	0	0
RU	7.62 mm DT Machine Gun (x2)	2x7.62mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
RU	.303 Maxim machine gun (x4)	4x7.92mmMG	AP	-	850	8	6	4	2	0	0	0	0	0	0
RU	.50 cal M2 Browning machine gun	12.7mmHMG	AP	B-30	850	12	11	10	9	8	7	6	5	4	0
RU	12.7 mm DShK heavy machine gun	12.7mmHMG	AP	B-30	850	12	10	7	4	1	1	0	0	0	0
RU	.50 cal M2 Browning machine gun	12.7mmHMG	AP	B-30	850	12	11	10	9	8	7	6	5	4	0
RU	12.7 mm DShK heavy machine gun (x2)	2x12.7mmHMG	AP	B-30	850	12	10	7	4	1	1	0	0	0	0
RU	12.7 mm DShK heavy machine gun (x3)	3x12.7mmHMG	AP	B-30	785	12	11	10	9	8	7	6	5	4	0
RU	.50 cal M2 Browning machine gun (x4)	4x12.7mmHMG	AP	-	1114	11	10	9	8	7	6	5	4	3	0

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
RU	PTRD-41	14.5mmATR	AP		1114	26	24	22	20	18	16	14	12	10	2
RU	PTRS-41	14.5mmATR	AP		790	26	24	22	20	18	16	14	12	10	2
RU	20 mm TNSh–1/TNSh-20	20mmL82.4	APCR		760	45	40	35	18	0	0	0	0	0	0
RU	20 mm TNSh–1/TNSh-20	20mmL82.4	AP		910	30	26	22	18	14	10	6	3	0	0
RU	25 mm 72-K AAD gun M1940	25mmL76.6	AP	BR-132	910	55	51	47	43	39	35	31	27	23	7
RU	25 mm 72-K AAD gun M1940	25mmL76.6	APHE	0	910	43	40	37	34	31	28	25	23	20	8
RU	25 mm 72-K AAD gun M1940 (x2)	2x25mmL76.6	AP	BR-132	910	55	53	51	49	47	45	43	41	39	31
RU	25 mm 72-K AAD gun M1940 (x2)	2x25mmL76.6	APHE	0	442	43	41	40	38	37	35	34	33	31	25
RU	37 mm PS1 Hotchkiss	37mmL22.8	AP		442	22	18	14	10	6	3	0	0	0	0
RU	37 mm PS1 Hotchkiss	37mmL22.8	APHE		442	22	20	17	14	11	8	5	3	0	0
RU	37 mm PS2 Hotchkiss	37mmL22.8	APCR	-	442	28	8	-12	-6	0	0	0	0	0	0
RU	37 mm PS2 Hotchkiss	37mmL22.8	AP		442	22	18	14	10	6	3	0	0	0	0
RU	37 mm PS2 Hotchkiss	37mmL22.8	APHE		442	22	20	17	14	11	8	5	3	0	0
RU	37 mm 1-K M1930	37mmL46	AP	-	800	28	25	22	21	19	17	15	12	9	0
RU	37 mm M5 Gun	37mmL53	APCBC	-	792	59	56	53	50	46	43	40	38	35	23
RU	37 mm M5 Gun	37mmL53	AP	-	625	37	32	27	23	19	14	9	5	0	0
RU	37 mm Automatic Gun M1	37mmL54	APC	-	792	26	25	23	21	18	17	15	14	13	6
RU	37 mm 61-K AAD gun M1939	37mmL73.8	AP	BR-167	880	39	34	30	26	23	19	14	10	5	0
RU	37 mm 61-K AAD gun M1939 (x2)	2x37mmL73.8	AP	BR-167	880	39	34	30	26	23	19	14	10	5	0
RU	2 pounder gun	40mmL50	APCBC	-	792	65	61	58	54	50	46	42	38	34	18
RU	2 pounder gun	40mmL50	APC	-	792	55	51	47	42	37	32	27	22	18	0
RU	2 pounder gun	40mmL50	AP	-	1280	49	43	37	32	27	22	17	12	6	0
RU	2 pounder gun	40mmL50	APCNR	-	760	139	129	119	109	99	89	79	69	59	19
RU	45 mm model 1933	45mmL36	APC	-	760	-	-	-	-	-	-	-	-	-	-
RU	45 mm model 1933	45mmL36	APBC	BRZ-240	760	-	-	-	-	-	-	-	-	-	-
RU	45 mm model 1933	45mmL36	AP	B-240 & BR-240	760	-	-	-	-	-	-	-	-	-	-
RU	45 mm 19-K M1932	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
RU	45 mm 19-K M1932	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
RU	45 mm 19-K M1932	45mmL46	APBC	BRZ-240	760	53	46	38	31	23	16	8	4	0	0
RU	45 mm 20-K M1932	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
RU	45 mm 20-K M1932	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
RU	45 mm 20-K M1932	45mmL46	APBC	BRZ-240	760	53	46	38	31	23	16	8	4	0	0
RU	45 mm 53-K M1937	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
RU	45 mm 53-K M1937	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
RU	45 mm 53-K M1937	45mmL46	APBC	BRZ-240	760	53	46	38	31	23	16	8	4	0	0
RU	45 mm 53-K M1938	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
RU	45 mm 53-K M1938	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
RU	45 mm 53-K M1938	45mmL46	APBC	BRZ-240	760	53	46	38	31	23	16	8	4	0	0
RU	45 mm model 1932	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
RU	45 mm model 1932	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
RU	45 mm model 1932	45mmL46	APBC	BRZ-240	760	53	46	38	31	23	16	8	4	0	0
RU	45 mm M-42 M1942	45mmL66.2	APCR	BR-240P	870	76	56	36	18	0	0	0	0	0	0
RU	45 mm M-42 M1942	45mmL66.2	APCBC	-	870	70	61	52	43	34	25	16	8	0	0
RU	45 mm M-42 M1942	45mmL66.2	APBC	BRZ-240	870	70	61	52	43	34	25	16	8	0	0
RU	57 mm gun M1 L/43	57mmL43	APCBC	APCBC, Mk 9T	820	95	91	87	84	80	77	74	71	67	53
RU	6 pounder gun Mk III	57mmL43	APCBC	APCBC, Mk 9T	820	84	79	75	71	67	65	63	61	60	44
RU	57 mm gun M1/M2	57mmL50	APCBC	APCBC, Mk 9T	831	94	89	84	79	75	73	70	69	67	49
RU	6 pounder gun Mk V	57mmL50	APCBC	APCBC, Mk 9T	831	94	89	84	79	75	73	70	69	67	49
RU	57 mm ZiS-2 M1941/43	57mmL72.9	APCR	BR-271P	1040	125	113	100	88	75	63	50	38	25	0
RU	57 mm ZiS-2 M1941/43	57mmL72.9	APCBC	BR-271M	990	105	100	95	90	85	80	75	70	65	45
RU	57 mm ZiS-2 M1941/43	57mmL72.9	APBC	BR-271	990	95	90	85	78	70	65	60	58	55	35
RU	57 mm ZiS-2 M1941/43	57mmL72.9	AP	BR-271K	1000	95	90	85	78	70	65	60	58	55	35
RU	75 mm M2 Gun	75mmL31	APCBC	APC M61	588	65	62	60	58	55	53	51	49	46	37
RU	75 mm M2 Gun	75mmL31	AP	AP M72	380	67	64	60	57	53	50	46	42	38	23
RU	QF 75 mm Mk V	75mmL36.5	APCBC	APC M61	618	73	71	68	65	62	60	57	55	52	41
RU	75 mm M3 Gun	75mmL37.5	APCBC	APC M61	380	71	69	66	63	60	58	55	53	50	39

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
RU	75 mm M3 Gun	75mmL37.5	APC	HE M48	619	87	82	76	70	63	57	51	47	43	21
RU	75 mm M3 Gun	75mmL37.5	AP	AP M72	380	87	82	76	70	63	57	51	47	43	21
RU	76 mm M1 Gun	76mmL57	APCBC	APC M62	853	99	96	93	91	88	85	82	79	75	63
RU	76.2 mm KT obr.1927/32	76.2mmL16.4	APHE	BR-350A	370	26	25	23	22	21	19	18	16	15	9
RU	76.2 mm KT-26	76.2mmL16.4	APHE	BR-350A	370	26	25	23	22	21	19	18	16	15	9
RU	76.2 mm KT-28	76.2mmL16.4	APHE	BR-350A	370	26	25	23	22	21	19	18	16	15	9
RU	76.2 mm M1927	76.2mmL16.4	APHE	BR-350A	370	26	25	23	22	21	19	18	16	15	9
RU	76.2 mm OB-25 M1943	76.2mmL16.4	APHE	BR-350A	370	26	25	23	22	21	19	18	16	15	9
RU	76.2 mm PS-3	76.2mmL20.5	APHE	BR-350A	530	-	-	-	-	-	-	-	-	-	-
RU	76.2 mm L-10	76.2mmL23.7	APHE	BR-350A	500	57	51	46	41	37	32	26	21	15	0
RU	76.2 mm L-10	76.2mmL23.7	HEAT	BR-353A	325	56	56	56	56	56	56	56	56	56	56
RU	76.2 mm L-10	76.2mmL23.7	HEATi	BR-353C	500	90	90	90	90	90	90	90	90	90	90
RU	76.2 mm M1902/1930	76.2mmL30	APHE	BR-350A	710	68	64	60	56	52	48	44	40	36	20
RU	76.2 mm L-11	76.2mmL30.5	APBC	-	612	53	49	45	42	39	35	31	27	23	7
RU	76.2 mm L-11	76.2mmL30.5	APHE	BR-350A	610	54	50	46	44	42	40	37	35	33	18
RU	76.2 mm L-11	76.2mmL30.5	HEAT	BR-353A	325	56	56	56	56	56	56	56	56	56	56
RU	76.2 mm L-11	76.2mmL30.5	HEATi	BR-353C	610	90	90	90	90	90	90	90	90	90	90
RU	76.2 mm F-32	76.2mmL31.5	APBC	-	612	53	49	45	42	39	35	31	27	23	7
RU	76.2 mm F-32	76.2mmL31.5	APHE	BR-350A	680	53	49	45	42	39	35	31	27	23	7
RU	76.2 mm F-32	76.2mmL31.5	HEAT	BR-353A	610	56	56	56	56	56	56	56	56	56	56
RU	76.2 mm M1902/1930 (L40)	76.2mmL40	APHE	BR-350A	710	65	62	59	55	51	47	43	41	39	26
RU	76.2 mm F-34 M1940	76.2mmL41.5	APCR	BR-350P	612	101	85	69	57	45	29	13	6	0	0
RU	76.2 mm F-34 M1940	76.2mmL41.5	APCBC	-	612	53	49	45	42	39	35	31	27	23	7
RU	76.2 mm F-34 M1940	76.2mmL41.5	APBC	-	612	53	49	45	42	39	35	31	27	23	7
RU	76.2 mm F-34 M1940	76.2mmL41.5	AP	-	655	51	48	45	42	39	35	31	27	23	7
RU	76.2 mm F-34 M1940	76.2mmL41.5	APHE	BR-350A	680	66	59	51	48	45	43	40	38	36	16
RU	76.2 mm F-34 M1940	76.2mmL41.5	HEAT	BR-353A	325	56	56	56	56	56	56	56	56	56	56
RU	76.2 mm F-34 M1940	76.2mmL41.5	HEATi	BR-353C	680	90	90	90	90	90	90	90	90	90	90
RU	76.2 mm ZiS-5	76.2mmL41.5	APCR	BR-350P	612	101	85	69	57	45	29	13	6	0	0
RU	76.2 mm ZiS-5	76.2mmL41.5	APCBC	-	612	55	51	47	43	39	35	31	27	23	8
RU	76.2 mm ZiS-5	76.2mmL41.5	APBC	-	612	53	49	45	42	39	35	31	27	23	7
RU	76.2 mm ZiS-5	76.2mmL41.5	AP	-	655	51	48	45	42	39	35	31	27	23	7
RU	76.2 mm ZiS-5	76.2mmL41.5	APHE	BR-350A	325	66	59	51	48	45	43	40	38	36	16
RU	76.2 mm ZiS-5	76.2mmL41.5	HEAT	BR-353A	325	56	56	56	56	56	56	56	56	56	56
RU	76.2 mm ZiS-5	76.2mmL41.5	HEATi	BR-353C	680	90	90	90	90	90	90	90	90	90	90
RU	76.2 mm F-22 USV M1939	76.2mmL42	APCR	-	740	-	-	-	-	-	-	-	-	-	-
RU	76.2 mm F-22 USV M1939	76.2mmL42	APCBC	Pzgr.39 rot	662	108	103	98	93	88	84	79	75	71	53
RU	76.2 mm F-22 USV M1939	76.2mmL42	APHE	BR-350A	325	67	64	61	58	55	52	49	46	43	31
RU	76.2 mm F-22 USV M1939	76.2mmL42	HEAT	BR-353A	325	56	56	56	56	56	56	56	56	56	56
RU	76.2 mm F-22 USV M1939	76.2mmL42	HEATi	BR-353C	710	90	90	90	90	90	90	90	90	90	90
RU	76.2 mm F-22 M1936	76.2mmL51.2	APCR	-	690	152	135	118	105	92	82	71	63	55	7
RU	76.2 mm F-22 M1936	76.2mmL51.2	APBC	BR-350BSP	690	67	64	61	58	55	52	49	46	43	31
RU	76.2 mm F-22 M1936	76.2mmL51.2	APHE	BR-350A	710	67	64	61	58	55	52	49	46	43	31
RU	76.2 mm ZiS-3 M1942	76.2mmL51.6	APCR	-	690	-	-	-	-	-	-	-	-	-	-
RU	76.2 mm ZiS-3 M1942	76.2mmL51.6	APBC	BR-350SP	680	67	64	61	58	55	52	49	46	43	31
RU	76.2 mm ZiS-3 M1942	76.2mmL51.6	APHE	BR-350A	710	67	64	61	58	55	52	49	46	43	31
RU	76.2 mm ZiS-3Sh	76.2mmL51.6	APCR	-	690	-	-	-	-	-	-	-	-	-	-
RU	76.2 mm ZiS-3Sh	76.2mmL51.6	APBC	BR-350SP	680	67	64	61	58	55	52	49	46	43	31
RU	76.2 mm ZiS-3Sh	76.2mmL51.6	APHE	BR-350A	710	67	64	61	58	55	52	49	46	43	31
RU	76.2 mm AD gun M1931	76.2mmL55	APHE	BR-361/361SP	710	68	63	58	54	51	46	41	36	31	11
RU	85 mm F-30	85mmL53.9	APCR	BR-365P	792	147	124	100	90	80	70	60	46	31	0
RU	85 mm F-30	85mmL53.9	APCBC	-	792	103	99	94	90	86	82	77	71	64	45
RU	85 mm F-30	85mmL53.9	APBC	BR-365	792	97	94	90	88	85	80	75	73	70	57
RU	85 mm F-30	85mmL53.9	APHE	BR-365		83	79	76	72	67	63	58	54	49	31
RU	85 mm ZiS-53	85mmL53.9	APCR	BR-365P	792	138	119	100	90	80	70	60	47	34	0
RU	85 mm ZiS-53	85mmL53.9	APBC	BR-365	792	97	94	90	88	85	80	75	73	70	57

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
RU	85 mm ZiS-53	85mmL53.9	APHE	BR-365		83	79	76	72	67	63	58	54	49	31
RU	85 mm ZiS-S-53	85mmL53.9	APCR	BR-365P	792	147	124	100	90	80	70	60	46	31	0
RU	85 mm ZiS-S-53	85mmL53.9	APCBC	-	792	103	99	94	90	86	82	77	71	64	45
RU	85 mm ZiS-S-53	85mmL53.9	APC	-	792	96	92	88	82	76	72	68	63	59	40
RU	85 mm ZiS-S-53	85mmL53.9	APBC	BR-365	792	97	94	90	88	85	80	75	73	70	57
RU	85 mm ZiS-S-53	85mmL53.9	APHE	BR-365		83	79	76	72	67	63	58	54	49	31
RU	85 mm D-5T	85mmL54.6	APCBC	-	792	103	99	94	90	86	82	77	71	64	45
RU	85 mm D-5T	85mmL54.6	APBC	BR-365	792	97	94	90	88	85	80	75	73	70	57
RU	85 mm D-5T	85mmL54.6	AP	BR-365K		95	93	90	83	75	70	65	60	55	35
RU	85 mm 52K M1939 (KS-12)	85mmL55	APCR	-	792	131	116	101	88	75	65	54	47	40	0
RU	85 mm 52K M1939 (KS-12)	85mmL55	APCBC	-	792	106	100	93	87	80	74	69	63	58	26
RU	85 mm 52K M1939 (KS-12)	85mmL55	APBC	BR-365K	792	104	98	92	85	78	73	68	64	60	31
RU	85 mm 52K M1939 (KS-12)	85mmL55	AP	BR-365	792	99	95	91	87	83	79	75	71	67	51
RU	85 mm D-44 M1944	85mmL55.2	APCR	BR-365P	792	147	124	100	90	80	70	60	46	31	0
RU	85 mm D-44 M1944	85mmL55.2	APCBC	-	792	86	83	81	78	75	71	67	63	59	43
RU	85 mm D-44 M1944	85mmL55.2	APBC	BR-365	500	97	94	90	88	85	80	75	73	70	57
RU	85 mm D-44 M1944	85mmL55.2	HEAT	Type-56	792	100	100	100	100	100	100	100	100	100	100
RU	RPG-40	90mmATGr	HEAT	-	10	22	22	22	22	22	22	22	22	22	22
RU	RPG-43	95mmATGr	HEAT	-	1050	22	22	22	22	22	22	22	22	22	22
RU	100 mm D-10S	100mmL59	APCR	-	887	163	153	143	133	123	113	103	93	83	43
RU	100 mm D-10S	100mmL59	APCBC	BR-412D	895	150	145	140	135	130	125	120	110	100	75
RU	100 mm D-10S	100mmL59	APBC	BR-412B	895	130	125	120	115	110	105	100	93	85	63
RU	100 mm D-10S	100mmL59	AP	BR-412	900	125	118	110	103	95	88	80	70	60	28
RU	100 mm BS-3 M1944	100mmL59.6	APCR	-	887	163	153	143	133	123	113	103	93	83	43
RU	100 mm BS-3 M1944	100mmL59.6	APCBC	BR-412D	895	150	145	140	135	130	125	120	110	100	75
RU	100 mm BS-3 M1944	100mmL59.6	APBC	BR-412B	895	130	125	120	115	110	105	100	93	85	63
RU	100 mm BS-3 M1944	100mmL59.6	AP	BR-412	900	125	118	110	103	95	88	80	70	60	28
RU	107 mm gun M1910/30g	107mmL38	APBC	BR-420	670	95	93	90	87	84	81	78	75	72	61
RU	107 mm gun M1910/30n	107mmL48	APBC	BR-420	670	95	93	90	87	84	81	78	75	72	61
RU	122 mm M-30 how M1938	122mmL22	HEAT	BP-460A	325	149	149	149	149	149	149	149	149	149	149
RU	122 mm M-30S how M1938	122mmL22	HEAT	BP-460A	325	149	149	149	149	149	149	149	149	149	149
RU	122 mm A-19S M1931/37	122mmL47.9	APCR	-	588	153	143	133	123	113	103	93	83	73	33
RU	122 mm A-19S M1931/37	122mmL47.9	APBC	BR-471B	800	136	132	128	124	120	116	113	109	105	90
RU	122 mm A-19S M1931/37	122mmL47.9	APHE	BR-471	500	131	126	122	118	113	109	105	100	96	79
RU	122 mm A-19S M1931/37	122mmL47.9	HEAT	-	806	149	149	149	149	149	149	149	149	149	149
RU	122 mm D-25T	122mmL48.5	APCR	-	588	153	143	133	123	113	103	93	83	73	33
RU	122 mm D-25T	122mmL48.5	APBC	BR-471B	800	136	132	128	124	120	116	113	109	105	90
RU	122 mm D-25T	122mmL48.5	APHE	BR-471	806	131	126	122	118	113	109	105	100	96	79
RU	152 mm D-1 how M1943	152mmL20	APHE	Naval 1915/28	560	73	72	71	69	67	66	64	62	60	54
RU	152 mm D-1 how M1943	152mmL20	HEATi	BP-540		93	93	93	93	93	93	93	93	93	93
RU	152 mm M-10 how M1938	152mmL20	APHE	Naval 1915/28	560	73	72	71	69	67	66	64	62	60	54
RU	152 mm M-10 how M1938	152mmL20	HEATi	BP-540i		187	187	187	187	187	187	187	187	187	187
RU	152 mm M1910/30 Gun	152mmL29	APBC	BR-540B	655	112	108	105	103	100	98	95	90	85	72
RU	152 mm M1910/30 Gun	152mmL29	APHE	BR-540	560	115	110	105	100	95	90	85	80	75	55
RU	152 mm M1910/30 Gun	152mmL29	HEAT	BP-540	680	93	93	93	93	93	93	93	93	93	93
RU	152 mm M1910/30 Gun	152mmL29	HEATi	BP-540C	650	187	187	187	187	187	187	187	187	187	187
RU	152 mm ML-20 gun-how M1937	152mmL29	APBC	BR-540B	655	112	108	105	103	100	98	95	90	85	72
RU	152 mm ML-20 gun-how M1937	152mmL29	APHE	BR-540	560	115	110	105	100	95	90	85	80	75	55
RU	152 mm ML-20 gun-how M1937	152mmL29	HEAT	BP-540	680	93	93	93	93	93	93	93	93	93	93
RU	152 mm ML-20 gun-how M1937	152mmL29	HEATi	BP-540C	650	187	187	187	187	187	187	187	187	187	187
RU	152 mm ML-20S gun-how M1937	152mmL29	APBC	BR-540B	655	112	108	105	103	100	98	95	90	85	72
RU	152 mm ML-20S gun-how M1937	152mmL29	APHE	BR-540	560	115	110	105	100	95	90	85	80	75	55
RU	152 mm ML-20S gun-how M1937	152mmL29	HEAT	BP-540	680	93	93	93	93	93	93	93	93	93	93
RU	152 mm ML-20S gun-how M1937	152mmL29	HEATi	BP-540C	650	187	187	187	187	187	187	187	187	187	187
RU	152 mm M1910/34 Gun	152mmL32	APHE	Naval 1915/28	436	73	72	71	69	67	66	64	62	60	54
CZH	7.92 mm Schwarzlose MG vz. 07/24	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
CZH	7.92 mm ZB vz. 26 LMG	7.92mmLMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
CZH	7.92 mm ZB vz. 26 machine gun (x2)	2x7.92mmMG	AP	-	-	8	6	4	2	0	0	0	0	0	0
CZH	37.2 mm ÚV vz. 34 gun L/40	37mmL37	AP		675	37	34	31	29	26	24	22	20	17	7
CZH	3,7 cm KPÚV vz. 34 L/40	37mmL40	APCR	Pzgr 40	675	60	50	39	29	18	9	0	0	0	0
CZH	3,7 cm KPÚV vz. 34 L/40	37mmL40	AP	Pzgr. (t)	1050	35	33	30	27	23	22	21	19	16	7
CZH	3,7 cm KPÚV vz. 37 L/47.8	37mmL47.8	APCR	Pzgr 40	741	64	49	33	18	2	1	0	0	0	0
CZH	3,7 cm KPÚV vz. 37 L/47.8	37mmL47.8	AP	Pzgr. (t)		36	34	31	28	24	23	22	20	17	8
CZH	3,7 cm ÚV vz. 38 L/47.8	37mmL47.8	APCR	Pzgr 40	741	64	49	33	18	2	1	0	0	0	0
CZH	3,7 cm ÚV vz. 38 L/47.8	37mmL47.8	AP	Pzgr. (t)		36	34	31	28	24	23	22	20	17	8
CZH	37 mm Bofors m/38 gun	37mmL53	APC		870	43	40	36	33	29	26	22	19	15	1
CZH	37 mm Bofors m/38 gun	37mmL53	AP		870	40	37	33	27	20	18	15	11	7	0
CZH	40 mm Bofors gun	40mmL60	AP	-	-	55	51	47	42	37	32	27	22	18	0
CZH	4,7 cm Škoda A9 vz.32 L/33	47mmL33	APC	-	660	-	-	-	-	-	-	-	-	-	-
CZH	4,7 cm Škoda A9 vz.32 L/33	47mmL33	AP			39	36	33	30	26	23	20	17	14	1
CZH	4,7 cm Škoda A11 vz.38 L/43	47mmL43	APCR	Pzgr 40	785	100	80	59	39	18	9	0	0	0	0
CZH	4,7 cm Škoda A11 vz.38 L/43	47mmL43	AP			55	51	48	45	41	38	35	32	29	16
CZH	4,7 cm KPÚV vz. 36 L/43	47mmL43	APC	Pzgr. 36 (t)	1080	54	51	48	45	41	38	35	32	29	16
CZH	4,7 cm KPÚV vz. 36 L/43	47mmL43	APCR	Pzgr 40	785	100	80	59	39	18	9	0	0	0	0
CZH	4,7 cm KPÚV vz. 36 L/43	47mmL43	AP			55	51	48	45	41	38	35	32	29	16
CZH	Anti-Tank Mine	60mmATGr	HEAT	-	-	22	22	22	22	22	22	22	22	22	22
SWD	6.5 mm Kg m/40 LMG	6.5mmLMG	AP	-	-	-	-	-	-	-	-	-	-	-	-
SWD	7.92 mm Schwarzlose MG vz. 07/24	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
SWD	7.92 mm Twin Schwarzlose MG vz. 07/24	2x7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
SWD	8 mm m/36 machine-guns	8mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
SWD	8 mm m/36 machine-guns (x2)	2x8mmMG	AP	-	780	8	6	4	2	0	0	0	0	0	0
SWD	Madsen 20 mm cannon	20mmL60	AP	-	705	20	17	14	12	9	6	4	2	0	0
SWD	37 mm Puteaux SA 38	37mmL33	APC	ODR mle.38	705	29	26	23	20	16	14	12	9	6	0
SWD	37 mm Puteaux SA 38	37mmL33	AP	-	600	37	33	29	25	21	17	13	9	5	0
SWD	37 mm Bofors	37mmL45	AP	-	870	40	37	33	27	20	18	15	11	7	0
SWD	37 mm Bofors	37mmL45	APHE	-	-	35	32	29	26	22	21	20	18	15	5
SWD	37 mm Bofors m/38 gun	37mmL53	APC		870	43	40	36	33	29	26	22	19	15	1
SWD	37 mm Bofors m/38 gun	37mmL53	AP		870	40	37	33	27	20	18	15	11	7	0
SWD	Anti-Tank Mine	60mmATGr	HEAT	-	-	22	22	22	22	22	22	22	22	22	22
SWD	75 mm m/41 gun L/34	75mmL34	AP		596	67	64	60	57	53	50	46	42	38	23
SWD	10,5cm Haubits m/39	105mmL28	APCBC	-	395	63	61	59	57	54	52	50	48	46	38
SWD	10,5cm Haubits m/39	105mmL28	APHE	-	495	56	54	52	50	48	47	45	43	41	34
SWD	10,5cm Haubits m/39	105mmL28	HEAT	Gr.39 Hl	-	52	52	52	52	52	52	52	52	52	52
SPN	6.5 mm Breda M30 MG	2x6.5mmMG	AP	-	823	8	6	4	2	0	0	0	0	0	0
SPN	7.62 mm DT machine gun	7.62mmMG	AP	-	823	8	6	4	2	0	0	0	0	0	0
SPN	M1918 Browning Automatic Rifle	7.62mmLMG	AP	-	823	8	6	4	2	0	0	0	0	0	0
SPN	7.92 mm MG13 machine guns (x2)	2x7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
SPN	8 mm Hotchkiss machine gun	8mmMG	AP	-	780	8	6	4	2	0	0	0	0	0	0
SPN	20 mm Cannon	20mmC	AP	-	1050	20	17	14	12	9	6	4	2	0	0
SPN	2 cm FlaK 30 L/65	20mmL65	APCR	Pzgr 40	780	40	30	20	10	0	0	0	0	0	0
SPN	2 cm FlaK 30 L/65	20mmL65	AP	-	950	20	17	14	12	9	6	4	2	0	0
SPN	25 mm A/T gun SA 34	25mmL72	AP	-	-	35	33	30	25	20	16	13	9	5	0
SPN	37 mm Puteaux SA 18	37mmL21	APC	-	600	31	25	18	15	11	8	4	2	0	0
SPN	37 mm Puteaux SA 18	37mmL21	AP	-	388	29	25	21	17	13	9	5	3	0	0
SPN	37 mm Puteaux SA 18	37mmL21	APHE	-	-	12	10	8	6	4	2	0	0	0	0
SPN	37 mm PS2 Hotchkiss	37mmL22.8	AP		442	22	18	14	10	6	3	0	0	0	0
SPN	37 mm PS2 Hotchkiss	37mmL22.8	APHE		-	22	20	17	14	11	8	5	3	0	0
SPN	37 mm Bofors	37mmL45	AP	-	870	40	37	33	27	20	18	15	11	7	0
SPN	37 mm Bofors	37mmL45	APHE	-	-	35	32	29	26	22	21	20	18	15	5
SPN	37 mm 1-K M1930	37mmL46	AP	-	-	-	-	-	-	-	-	-	-	-	-
SPN	37 mm Bofors L/54	37mmL54	AP	-	870	40	37	33	27	20	18	15	11	7	0
SPN	37 mm Bofors L/54	37mmL54	APHE	-	870	36	34	31	28	25	22	19	16	14	2

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
SPN	37 mm Bofors L/54	37mmL54	AP	-	870	40	37	33	27	20	18	15	11	7	0
SPN	37 mm Bofors L/54	37mmL54	APHE	-	870	36	34	31	28	25	22	19	16	14	2
SPN	40 mm Bofors gun	40mmL60	AP	-	-	55	51	47	42	37	32	27	22	18	0
SPN	45 mm 20-K M1932	45mmL46	APCR	BR-240P	760	66	57	49	38	27	16	5	3	0	0
SPN	45 mm 20-K M1932	45mmL46	APC	B-240	760	45	42	38	35	31	28	24	21	17	3
SPN	45 mm 20-K M1932	45mmL46	APBC	BRZ-240	-	53	46	38	31	23	16	8	4	0	0
SPN	47 mm L/36	47mmL36	AP	-	-	39	36	33	30	26	23	20	17	14	1
SPN	47 mm L/39	47mmL39	AP	-	-	39	36	33	30	26	23	20	17	14	1
SPN	Anti-Tank Mine	60mmATGr	HEAT	-	-	22	22	22	22	22	22	22	22	22	22
SPN	75 mm SA 35	75mmL17.1	AP	-	475	48	44	40	36	32	28	24	20	16	0
SPN	75 mm SA 35	75mmL17.1	APHE	-	-	44	42	40	37	34	31	29	26	23	12
SPN	7,5 cm KwK 40 L/43	75mmL43	APCR	Pzgr 40	740	126	117	108	98	87	77	68	58	48	9
SPN	7,5 cm KwK 40 L/43	75mmL43	APCBC	Pzgr.39	680	99	95	91	86	81	77	72	68	63	45
SPN	7,5 cm KwK 40 L/43	75mmL43	AP	-	450	90	86	81	77	72	68	63	59	54	36
SPN	7,5 cm KwK 40 L/43	75mmL43	HEAT	Gr.38 HL/B	550	56	56	56	56	56	56	56	56	56	56
SPN	7,5 cm KwK 40 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
SPN	7,5 cm KwK 40 L/48	75mmL48	APCBC	-	680	106	101	96	91	85	80	74	69	64	43
SPN	7,5 cm KwK 40 L/48	75mmL48	AP	-	450	90	86	81	77	72	68	63	59	54	36
SPN	7,5 cm KwK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
SPN	7,5 cm KwK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
SPN	7,5 cm StuK 40 L/48	75mmL48	APCR	-	790	143	132	120	109	97	87	77	66	55	11
SPN	7,5 cm StuK 40 L/48	75mmL48	APCBC	-	680	106	101	96	91	85	80	74	69	64	43
SPN	7,5 cm StuK 40 L/48	75mmL48	AP	-	450	90	86	81	77	72	68	63	59	54	36
SPN	7,5 cm StuK 40 L/48	75mmL48	HEAT	Gr.38 HL/B	450	56	56	56	56	56	56	56	56	56	56
SPN	7,5 cm StuK 40 L/48	75mmL48	HEATi	Gr.38 HL/C	550	86	86	86	86	86	86	86	86	86	86
SPN	76.2 mm KT-28	76.2mmL16.4	APHE	-	-	26	25	23	22	21	19	18	16	15	9
SPN	76.2 mm M1902/1930	76.2mmL30	APHE	-	-	68	64	60	56	52	48	44	40	36	20
SPN	8,8 cm Flak 36 L/56	88mmL56	APCR	Pzgr 40	773	171	164	156	147	138	131	123	117	110	80
SPN	8,8 cm Flak 36 L/56	88mmL56	APCBC	Pzgr.39	773	132	121	110	105	99	95	91	87	83	59
SPN	8,8 cm Flak 36 L/56	88mmL56	APC	-	810	109	103	98	92	87	81	76	70	65	43
SPN	8,8 cm Flak 36 L/56	88mmL56	APHE	Pzgr. (Flak only)	600	98	96	93	90	87	84	80	76	72	59
SPN	10,5 cm leFH 18 L/28	105mmL28	APCBC	-	395	63	61	59	57	54	52	50	48	46	38
SPN	10,5 cm leFH 18 L/28	105mmL28	APHE	-	495	56	54	52	50	48	47	45	43	41	34
SPN	10,5 cm leFH 18 L/28	105mmL28	HEAT	Gr.39 Hl	-	52	52	52	52	52	52	52	52	52	52
SPN	10 cm sK 18 L/52	105mmL52	AP	-	835	0	-5	-9	-5	0	0	0	0	0	0
SPN	107 mm gun M1910/30g	107mmL38	APBC	BR-420	-	95	93	90	87	84	81	78	75	72	61
SPN	107 mm gun M1910/30n	107mmL48	APBC	-	-	-	-	-	-	-	-	-	-	-	-
SPN	122 mm M-30 how M1938	122mmL22	HEAT	-	-	149	149	149	149	149	149	149	149	149	149
SPN	152 mm ML-20 gun-how M1937	152mmL29	APBC	-	655	100	97	95	92	90	88	86	84	82	72
SPN	152 mm ML-20 gun-how M1937	152mmL29	APHE	-	560	100	97	95	92	90	88	86	84	82	72
SPN	152 mm ML-20 gun-how M1937	152mmL29	HEAT	BP-540	680	93	93	93	93	93	93	93	93	93	93
SPN	152 mm ML-20 gun-how M1937	152mmL29	HEATi	BP-540C	-	187	187	187	187	187	187	187	187	187	187
COM	7.92 mm Anti-Tank Rifle	7.92mmATR	AP	-	785	8	6	4	2	0	0	0	0	0	0
COM	7.92 mm machine gun	7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
COM	7.92 mm machine gun (x2)	2x7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
COM	7.92 mm machine gun (x4)	4x7.92mmMG	AP	-	785	8	6	4	2	0	0	0	0	0	0
COM	12.7 mm machine gun	12.7mmHMG	AP	-	785	11	10	9	8	7	6	5	4	3	0
COM	12.7 mm machine gun (x2)	2x12.7mmHMG	AP	-	785	11	10	9	8	7	6	5	4	3	0
COM	12.7 mm machine gun (x3)	3x12.7mmHMG	AP	-	785	11	10	9	8	7	6	5	4	3	0
COM	12.7 mm machine gun (x4)	4x12.7mmHMG	AP	-	785	11	10	9	8	7	6	5	4	3	0
COM	13.2 mm machine gun	13.2mmHMG	AP	-	884	11	10	9	8	7	6	5	4	3	0
COM	14.3 mm Anti-Tank Rifle	14.3mmATR	AP	-	884	23	21	19	17	15	13	11	9	7	0
COM	0.55 in Boys anti-tank rifle	14.3mmATR	AP	-	884	23	21	19	17	15	13	11	9	7	0
COM	14.5 mm Anti Tank Rifle.	14.5mmATR	AP	-	890	26	24	22	20	18	16	14	12	10	2
COM	15 mm machine gun	15mmHMG	AP	-	780	16	16	15	15	14	14	13	13	12	10
COM	20 mm Cannon	20mmC	AP	-	780	20	17	14	12	9	6	4	2	0	0

Nat	Name	Gun	Ammo	Name	m/s	300m	500m	750m	1000m	1250m	1500m	1750m	2000m	2500m	3000m
COM	20 mm Cannon (x2)	2x20mmC	AP	-	780	20	17	14	12	9	6	4	2	0	0
COM	20 mm Cannon (4)	4x20mmC	AP	-	-	20	17	14	12	9	6	4	2	0	0
COM	25 mm Cannon	25mmC	AP	-	870	-	-	-	-	-	-	-	-	-	-
COM	30 mm Cannon	30mmC	AP	-	870	40	37	33	27	20	18	15	11	7	0
COM	Twin 30 mm Cannon	2x30mmC	AP	-	-	40	37	33	27	20	18	15	11	7	0
COM	37 mm Cannon	37mmC	AP	-	-	-	-	-	-	-	-	-	-	-	-
COM	37 mm Cannon	37mmC	APHE	-	-	-	-	-	-	-	-	-	-	-	-
COM	37 mm Sticky Bomb	37mmATGr	HEAT	-	870	19	19	19	19	19	19	19	19	19	19
COM	37 mm Bofors	37mmL45	AP	-	870	40	37	33	27	20	18	15	11	7	0
COM	37 mm Bofors	37mmL45	APHE	-	-	35	32	29	26	22	21	20	18	15	5
COM	40 mm Cannon	40mmC	AP	-	-	-	-	-	-	-	-	-	-	-	-
COM	40 mm Cannon	40mmC	APHE	-	-	-	-	-	-	-	-	-	-	-	-

[16.0] VEHICLE ARMOUR TABLE

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
US	M20 SC	M20 Armored Utility Car	19	16	9	9
US	M8 AC	M8 light armored car	19	16	9	9
US	M2A3 LT	Light Tank M2A3	32	32	9	9
US	M2A4 LT	Light Tank M2A4	25	25	19	19
US	M3 LT(5MG)	Light Tank M3 w/5MG	38	38	25	25
US	M3 LT(3MG)	Light Tank M3 w/3MG	38	38	25	25
US	M3A1 LT(early)	Light Tank M3A1 w/M5	38	38	25	25
US	M3A1 LT(late)	Light Tank M3A1 w/M6	38	38	25	25
US	M3A3 LT(early)	Light Tank M3A3 w/M5	38	38	25	25
US	M3A3 LT(late)	Light Tank M3A3 w/M6	38	38	25	25
US	M5 LT	Light Tank M5	51	57	28	28
US	M5A1 LT	Light Tank M5A1	51	57	28	28
US	M22 LT	Light Tank M22	25	25	18	12
US	M24 LT Chaffee	Light Tank M24	63	63	25	33
US	M2A1 MT	Medium Tank M2A1	32	32	25	25
US	M3 MT(L31) Grant	Medium Tank M3(early) Grant	51	51	38	38
US	M3 MT(L31) Lee	Medium Tank M3(early) Lee	51	51	38	38
US	M3 MT(L41) Grant	Medium Tank M3(late) Grant	51	51	38	38
US	M3 MT(L41) Lee	Medium Tank M3(late) Lee	51	51	38	38
US	M3A3 MT(L31)	Medium Tank M3A3(early)	51	51	38	38
US	M3A3 MT(L41)	Medium Tank M3A3(late)	51	51	38	38
US	M3A5 MT(L31)	Medium Tank M3A5(early)	51	51	38	38
US	M3A5 MT(L41)	Medium Tank M3A5(late)	51	51	38	38
US	M4(75) MT	Medium Tank, M4	75	50	50	38
US	M4A1(75) MT	Medium Tank, M4A1	75	50	50	38
US	M4A1(76) MT	Medium Tank, M4A1	65	65	50	38
US	M4A2(75) MT	Medium Tank, M4A2	75	50	50	38
US	M4A2(76) MT	Medium Tank, M4A2	65	65	50	38
US	M4A2E8(76) MT	Medium Tank, M4A2E8	100	100	15	15
US	M4A3(75) MT	Medium Tank, M4A3	75	50	50	38
US	M4A3(75)W MT	Medium Tank, M4A3W	100	100	15	15
US	M4A3(76) MT	Medium Tank, M4A3	65	65	50	38
US	M4A3(76)W MT	Medium Tank, M4A3W	100	100	15	15
US	M4A3E8(76) MT	Medium Tank, M4A3E8	100	100	15	15
US	M4A4(75) MT	Medium Tank, M4A4	75	50	50	38
US	M26 Pershing	M26 HT	102	102	76	50
US	M26 Super Pershing	T26E1-1 HT	102	102	76	50
US	M4A3E2(75) AT	M4A3E2 Assault Tank	152	102	50	38
US	M4A3E2(76) AT	M4A3E2 Assault Tank	152	102	50	38
US	M4(105) MT	Medium Tank, M4	75	50	50	38
US	M4A3(105) MT	Medium Tank, M4A3	75	50	50	38
US	M4A3E2(105) MT	Medium Tank, M4A3, HVSS	100	100	15	15
US	M8 HMC	75 mm Howitzer Motor Carriage M8	28	28	25	25
US	M3 LT Recce	M3 Recconnaissance Tank	44	44	10	10
US	M5 LT Recce	M5 Reconnaissance Tank	44	44	10	10
US	M6 GMC	37 mm Gun Motor Carriage M6	0	0	0	0
US	M10 GMC(early)	3-inch Gun Motor Carriage, M10	60	37	25	20
US	M10 GMC(late)	76mm Gun Motor Carriage, M10	60	37	25	20

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
US	M18 GMC	M18 Gun Motor Carriage	25	12	12	8
US	M36 GMC	90 mm Gun Motor Carriage, M36	75	50	50	38
US	M36B1 GMC	90 mm Gun Motor Carriage, M36B1	108	108	9	9
US	M36B2 GMC	90 mm Gun Motor Carriage, M36B2	108	108	9	9
US	M19 MGMC	M19 Multiple Gun Motor Carriage	12	12	12	6
US	M37 HMC	M37 105 mm Howitzer Motor Carriage	38	38	10	10
US	M4 w/T34-60	Sherman w/T34 Calliope	100	100	15	15
US	M4 w/T40-20	Rocket Launcher T40/M17 (Whizbang)	100	100	15	15
US	Sherman Crab	Sherman Crab	75	50	50	38
US	M4A1(75) Flame I	Medium Tank, M4A1, w/Flamethrower	100	100	15	15
US	M4A1(75) Flame II	Medium Tank, M4A1, w/Flamethrower	100	100	15	15
US	Grant CDL (us)	Grant CDL	51	51	38	38
UK	Morris II	Morris Light Reconnaissance Car Mk.I (LRC)	7	7	7	7
UK	Rolls Royce 1924 I	Rolls-Royce 1924 Pattern	9	9	6	6
UK	Fordson	Fordson Armoured Car	9	9	6	6
UK	Morris AC	Morris CS9/Light Armoured Car	7	7	7	7
UK	Guy I	Guy Armoured Car Mk.I	15	15	6	6
UK	Guy IA	Guy Armoured Car Mk.IA	15	15	6	6
UK	M.Herrington I	Armoured Car, Marmon-Herrington Mk I	10	10	6	6
UK	M.Herrington II	Armoured Car, Marmon-Herrington Mk II	12	12	6	6
UK	M.Herrington II (20)	Armoured Car, Marmon-Herrington Mk II w/20mm	12	12	6	6
UK	M.Herrington II (47)	Armoured Car, Marmon-Herrington Mk II	12	12	6	6
UK	M.Herrington III	Armoured Car, Marmon-Herrington Mk III	12	12	6	6
UK	M.Herrington III (20)	Armoured Car, Marmon-Herrington Mk III w/20mm	12	12	6	6
UK	M.Herrington IV	Armoured Car, Marmon-Herrington Mk IV	12	12	6	6
UK	M.Herrington IVF	Armoured Car, Marmon-Herrington Mk IV	12	12	6	6
UK	Daimler AC I	Daimler Armoured Car	14	14	10	10
UK	Daimler AC II	Daimler Armoured Car	14	14	10	10
UK	Humber I	Humber Armoured Car Mk.I	15	15	6	6
UK	Humber II	Humber Armoured Car Mk.II	15	15	6	6
UK	Humber III	Humber Armoured Car Mk.III	15	15	6	6
UK	Humber lV(M5)	Humber Armoured Car Mk.IV	15	15	6	6
UK	Humber lV(M6)	Humber Armoured Car Mk.IV	15	15	6	6
UK	AEC I	AEC Armoured Car Mk.I	65	25	25	15
UK	AEC II	AEC Armoured Car Mk.II	65	30	30	15
UK	AEC III	AEC Armoured Car Mk.III	65	30	30	15
UK	Staghound I	Staghound Armoured Car Mk.I	30	20	20	15
UK	Staghound II	Staghound Armoured Car Mk.II	30	20	20	15
UK	Staghound III	Staghound Armoured Car Mk.III	30	20	20	15
UK	Vickers Lt II	Light Tank Mk II	14	15	11	6
UK	Vickers Lt II(MG)	Light Tank Mk II w/MG	14	15	11	6
UK	Vickers Lt III	Light Tank Mk III	14	15	11	6
UK	Vickers Lt III(MG)	Light Tank Mk III w/MG	14	15	11	6
UK	Stuart I	Light Tank M3 w/5MG	38	38	25	25
UK	Stuart I w/3MG	Light Tank M3 w/3MG	38	38	25	25
UK	Stuart III(early)	Light Tank M3A1 w/M5	38	38	25	25
UK	Stuart III(late)	Light Tank M3A1 w/M6	38	38	25	25
UK	Stuart V(early)	Light Tank M3A3 w/M5	38	38	25	25
UK	Stuart V(late)	Light Tank M3A3 w/M6	38	38	25	25
UK	Stuart VI(early)	Light Tank M5	51	57	28	28
UK	Stuart VI(late)	Light Tank M5A1	51	57	28	28
UK	Vickers Lt IV	Light Tank Mk IV	14	15	11	6
UK	Vickers Lt IV(MG)	Light Tank Mk IV w/MG	14	15	11	6
UK	Tetrarch I	Light Tank Mk VII Tetrarch	14	14	10	10
UK	Vickers Lt V	Light Tank Mk V	14	15	11	6
UK	Vickers Lt V1A	Light Tank Mk VIA	14	14	11	6

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
UK	Vickers Lt V1B	Light Tank Mk VIB	14	14	11	6
UK	Vickers Lt V1C	Light Tank Mk VIC	14	14	11	6
UK	Harry Hopkins	Light Tank Mk VIII Harry Hopkins	38	38	10	10
UK	Locust	Light Tank (Airborne) M22	25	25	9	9
UK	Chaffee	Light Tank M24	38	38	10	10
UK	Vickers 6t Type A	Vickers 6-Ton Tank Type A	13	13	4	4
UK	Vickers 6t Type B	Vickers 6-Ton Tank Type B	13	13	4	4
UK	Vickers Mk II	Vickers Medium Mark II	8	8	6	6
UK	A9 Cruiser I	Tank, Cruiser, Mk I (A9)	14	14	10	10
UK	A10 Cruiser II	Tank, Cruiser, Mk II (A10)	30	22	22	12
UK	A13 Cruiser III	Tank, Cruiser, Mk III (A13)	14	14	10	10
UK	A13 Cruiser IV	Tank, Cruiser, Mk IV (A13)	14	14	10	10
UK	Covenantor	A13 Mk.III Cruiser Mk.V Covenanter	40	40	14	14
UK	Crusader I	A15 Cruiser Mk.VI Crusader Mk.I	49	20	14	14
UK	Crusader II	A15 Cruiser Mk.VI Crusader Mk.II	49	30	14	14
UK	Crusader III	A15 Cruiser Mk.VI Crusader Mk.III	49	30	14	28
UK	Cavalier	A24 Cruiser Mk.VII Cavalier	76	63	32	32
UK	Centaur III	A27L Cruiser Mk.VIII Centaur Mk.III	76	63	32	32
UK	Cromwell I	A27M Cruiser Mk.VIII Cromwell Mk.I	76	63	32	32
UK	Cromwell II	A27M Cruiser Mk.VIII Cromwell Mk.II	76	63	32	32
UK	Cromwell III	A27M Cruiser Mk.VIII Cromwell MK.III	76	63	32	32
UK	Cromwell IV	A27M Cruiser Mk.VIII Cromwell Mk.IV	76	63	32	32
UK	Cromwell V	A27M Cruiser Mk.VIII Cromwell Mk.V	76	63	32	32
UK	Cromwell Vw	A27M Cruiser Mk.VIII Cromwell Mk.Vw	76	63	32	32
UK	Cromwell VIIw	A27M Cruiser Mk.VIII Cromwell Mk.VIIw	76	63	32	32
UK	Comet	A34 Cruiser Comet	102	76	29	25
UK	Challenger	A30 Cruiser Mk VIII Challenger	76	63	32	32
UK	Centurion I	A41 Tank, Cruiser, Centurion I	152	152	17	17
UK	Grant I(L31)	M3 MT(early)	51	51	38	38
UK	Grant I(L41)	M3 MT(late)	51	51	38	38
UK	Grant II(L31)	M3A5 MT(early)	51	51	38	38
UK	Grant II(L41)	M3A5 MT(late)	51	51	38	38
UK	Lee I(L31)	M3 MT(early)	51	51	38	38
UK	Lee I(L41)	M3 MT(late)	51	51	38	38
UK	Lee II(L31)	M3A5 MT(early)	51	51	38	38
UK	Lee II(L41)	M3A5 MT (late)	51	51	38	38
UK	Lee IV(L31)	M3A3 MT(early)	51	51	38	38
UK	Lee IV(L41)	M3A3 MT (late)	51	51	38	38
UK	Sherman I (75)	M4(75) MT	75	50	50	38
UK	Sherman II (75)	M4A1(75) MT	75	50	50	38
UK	Sherman II (76)	M4A1(76) MT	65	65	50	38
UK	Sherman III (75)	M4A2(75) MT	75	50	50	38
UK	Sherman III (76)	M4A2(76) MT	65	65	50	38
UK	Sherman IV (75)	M4A3(75) MT	75	50	50	38
UK	Sherman IV (76)	M4A3(76) MT	65	65	50	38
UK	Sherman IVA(76)	M4A3E8(76) MT	65	65	50	38
UK	Sherman V (75)	M4A4(75) MT	75	50	50	38
UK	Sherman VC	M4A4 VC MT	100	100	15	15
UK	Valentine I	Infantry Mk.III Valentine Mk.I	65	30	60	60
UK	Valentine II	Infantry Mk.III Valentine Mk.II	65	30	60	60
UK	Valentine III	Infantry Mk.III Valentine Mk.III	65	30	60	60
UK	Valentine IV	Infantry Mk.III Valentine Mk.IV	65	30	60	60
UK	Valentine V	Infantry Mk.III Valentine Mk.V	65	30	60	60
UK	Valentine VIII	Infantry Mk.III Valentine Mk.VIII	65	30	60	60
UK	Valentine IX	Infantry Mk.III Valentine Mk.IX	65	30	60	60
UK	Valentine X	Infantry Mk.III Valentine Mk.X	65	30	60	60

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
UK	Matilda I	A11 Matilda I	65	60	60	60
UK	Matilda I (12.7)	A11 Matilda I w/12.7mmHMG	65	60	60	60
UK	Matilda II	A12 Matilda II	75	48	70	55
UK	Churchill I	A22 Infantry Mk.IV Churchill Mk.I	88	88	76	50
UK	Churchill II	A22 Infantry Mk.IV Churchill Mk.II	88	88	76	50
UK	Churchill III	A22 Infantry Mk.IV Churchill Mk.III	88	88	76	50
UK	Churchill IV	A22 Infantry Mk.IV Churchill Mk.IV	88	88	76	50
UK	Churchill IVNA	A22 Infantry Mk.IV Churchill Mk.IVNA	88	88	76	50
UK	Churchill VI	A22 Infantry Mk.IV Churchill Mk.VI	88	88	76	64
UK	Churchill VII	A22 Infantry Mk.IV Churchill Mk.VII	152	152	95	50
UK	Churchill IX	A22 Infantry Mk.IV Churchill Mk.IX	152	152	95	50
UK	Churchill IX LT	A22 Infantry Mk.IV Churchill Mk.IX	152	152	95	50
UK	Churchill X	A22 Infantry Mk.IV Churchill Mk.X	152	152	95	50
UK	Churchill X LT	A22 Infantry Mk.IV Churchill Mk.X LT	152	152	95	50
UK	Black Prince	A43 Infantry Black Prince	152	152	25	25
UK	Tetrarch I CS	Light Tank Mk VII Tetrarch CS	14	14	10	10
UK	A9 Cruiser I CS	Tank, Cruiser, Mk I (A9) CS	14	14	10	10
UK	A10 Cruiser II CS	Tank, Cruiser, Mk II (A10) CS	30	30	6	6
UK	A13 Cruiser IV CS	Tank, Cruiser, Mk IV (A13) CS	38	38	6	6
UK	Covenantor CS	A13 Mk.III Cruiser Mk.V CS Covenanter	40	40	14	14
UK	Crusader I CS	Cruiser Mk.VI CS Crusader Mk.I	49	20	14	14
UK	Crusader II CS	Cruiser Mk.VI CS Crusader Mk.II	49	30	14	14
UK	Centaur IV	A27L Cruiser Mk.VIII Centaur Mk.IV	76	63	32	32
UK	Cromwell VI	A27M Cruiser Mk.VIII Cromwell Mk.VI	76	63	32	32
UK	Cromwell VIw	A27M Cruiser Mk.VIII Cromwell Mk.Viw	76	63	32	32
UK	Cromwell VIII	A27M Cruiser Mk.VIII Cromwell Mk.VIII	76	63	32	32
UK	Cromwell VIIIw	A27M Cruiser Mk.VIII Cromwell Mk.VIIIw	76	63	32	32
UK	Sherman I (105)	M4(105) MT	75	50	50	38
UK	Sherman II (105)	M4A1(105) MT	75	50	50	38
UK	Sherman III (105)	M4A2(105) MT	75	50	50	38
UK	Sherman IV (105)	M4A3(105) MT	75	50	50	38
UK	Sherman V (105)	M4A4(105) MT	75	50	50	38
UK	Matilda II CS	A12 Matilda II CS	75	48	70	55
UK	Churchill II CS	A22 Infantry Mk.IV Churchill Mk.II CS	88	88	76	50
UK	Churchill V CS	A22 Infantry Mk.IV Churchill Mk.V CS	88	88	76	50
UK	Churchill VIII CS	A22 Infantry Mk.IV Churchill Mk.VIII	152	152	95	50
UK	Churchill XI CS	A22 Infantry Mk.IV Churchill Mk.XI	152	152	95	50
UK	Stuart I R	Stuart I Reconnaisance Tank.	38	38	25	25
UK	Stuart VI R	Stuart VI Reconnaissance Tank.	51	57	28	28
UK	Archer	Self Propelled 17pdr, Valentine, Mk I, Archer	65	30	60	60
UK	Wolverine(early)	3-inch Gun Motor Carriage, M10	57	38	19	19
UK	Wolverine(late)	76mm Gun Motor Carriage, M10	57	38	19	19
UK	Achilles	17 pounder, Self-Propelled, Achilles	57	38	19	19
UK	Avenger	Self Propelled 17pdr, A30, Avenger	102	102	20	20
UK	Morris CS9 AA	Morris CS9/AA	7	7	7	7
UK	Vickers LtAA I	Tank, Light, AA Mk I	14	14	11	6
UK	Vickers LtAA II	Tank, Light, AA Mk II	14	14	11	6
UK	Vickers LtAA V	Tank, Light, AA Mk V	14	14	11	6
UK	Humber AA I	Mark I AA / Quad AA	15	15	8	8
UK	Skink	Tank AA, 20 mm Quad, Skink	100	100	15	15
UK	Staghound AA	T17E2 Staghound AA	30	20	20	15
UK	Centaur I AA I	Centaur, AA Mk I	76	63	32	32
UK	Centaur II AA II	Centaur, AA Mk II	76	63	32	32
UK	Crusader I AA I	Crusader III, AA Mk I	49	20	14	14
UK	Crusader II AA II	Crusader III, AA Mk II	49	30	14	28
UK	Crusader III AA III	Crusader III, AA Mk III	49	30	14	28

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
UK	Bishop	Carrier Valentine 25-pdr Mk 1	51	30	60	60
UK	Petard	Petard Spigot Mortar w/Churchill	102	102	16	16
UK	Mech Rifle Coy (Kangaroo) (44-45) (uk)	Mechanised Rifle Coy (Kangaroo) (44-45)	102	102	16	16
UK	Churchill AVRE	Churchill AVRE	102	102	16	16
UK	Matilda Scorpion	Matilda Scorpion mine flail tank	78	78	14	14
UK	Matilda FROG/MURRAY	Matilda FROG/MURRAY	78	78	14	14
UK	Churchill Crocodile	Churchill Crocodile	152	152	95	50
UK	Churchill OKE	Oke flamethrowing tank, Churchill	102	102	16	16
UK	Crusader Gun Tractor	Crusader Gun Tractor	49	49	7	7
UK	Stuart I Command	Stuart I Command	38	38	25	25
UK	Stuart VI Command	Stuart VI Command	51	57	28	28
UK	Valentine XI CMD	Infantry Mk.III Valentine Mk.XI(OP)	65	30	60	60
UK	Cavalier OP	A24 Cruiser Mk.VII Cavalier OP	76	63	32	32
UK	Cromwell I OP	A27M Cruiser Mk.VIII Cromwell Mk.I OP	76	63	32	32
UK	Cromwell II OP	A27M Cruiser Mk.VIII Cromwell Mk.II OP	76	63	32	32
UK	Cromwell III OP	A27M Cruiser Mk.VIII Cromwell MK.III OP	76	63	32	32
UK	Centaur III OP	A27L Cruiser Mk.VIII Centaur Mk.III OP	76	63	32	32
UK	Churchill VI OP	Churchill VI OP	102	102	16	16
UK	Stuart III OP	Stuart III OP	38	38	25	25
UK	Valentine XI OP	Infantry Mk.III Valentine Mk.XI(OP)	65	30	60	60
UK	Grant CDL	Grant CDL	51	51	38	38
UK	Matilda CDL	Canal Defence Light, Matilda	75	48	70	55
CAN	RAM Mk.I	Tank, Cruiser, Ram II	87	87	63	38
CAN	RAM Mk.II	Tank, Cruiser, Ram II	87	87	63	38
CAN	Grizzly MT	Medium Tank, M4A1	75	50	50	38
CAN	Lee I(L31)	M3 MT(early)	51	51	38	38
CAN	Lee I(L41)	M3 MT(late)	51	51	38	38
CAN	Valentine VI	Infantry Mk.III Valentine Mk.VI	65	30	60	60
CAN	Valentine VII	Infantry Mk.III Valentine Mk.VII	65	30	60	60
CAN	Churchill I (uk)	A22 Infantry Mk.IV Churchill Mk.I	88	88	76	50
CAN	Grizzly AA	Grizzly (M4A1 Sherman)	75	50	50	38
CAN	Skink	Tank AA, 20 mm Quad, Skink	100	100	15	15
CAN	Arm Rifle Coy (Kangaroo) (44-45) (can)	Armoured Rifle Coy (Kangaroo) (44-45)	102	102	16	16
IND	Chevrolet/Crossley	Chevrolet/Crossley	9	9	6	6
FR	P16 AMC-29	AMC Schneider 29	11	11	11	11
FR	P16 AMC-29 (MG)	AMC Schneider 29 w/MG	11	11	11	11
FR	Panhard 165 AC	Panhard AMD 165 A/C	26	20	15	15
FR	Panhard 175 AC	Panhard AMD 175 A/C	26	20	15	15
FR	Panhard 178 AC	Panhard 178 A/C	26	20	15	15
FR	Panhard 178 AC (MG)	Panhard 178 A/C w/MG	26	20	15	15
FR	FT-17(MG) LT	FT-17 w/MG	16	16	16	16
FR	FT-17(37) LT	FT-17 w/37mm	16	16	16	16
FR	AMR-33(MG) LT	Automitrailleuse de Reconnaissance Renault Modèle 1933 w/MG	13	13	8	8
FR	AMR-35(MG) LT	Automitrailleuse de Reconnaissance Renault Modèle 35 AVIS-1 w/MG	13	13	8	8
FR	AMR-35(13.2mm) LT	Automitrailleuse de Reconnaissance Renault Modèle 35 AVIS-2	13	13	8	8
FR	AMR-35(25) LT	Automitrailleuse de Reconnaissance Renault Modèle 35 Type ZT-2	13	13	8	8
FR	FCM-36 LT	Char léger Modèle 1936 FCM	40	35	20	20
FR	H-35 LT	Char léger modèle 1935 H	45	34	34	34
FR	H-39 LT (L21)	Char léger modèle 1935 H modifié 39	45	34	34	34
FR	H-39 LT (L33)	Char léger modèle 1935 H modifié 39	45	34	34	34
FR	H-40 LT	Char léger modèle 1935 H modifié 40	45	34	34	34
FR	R-35 LT	Char léger Modèle 1935 R	45	32	40	40
FR	R-38 LT	Char léger modèle 1935 R modifié 1938	45	32	40	40
FR	R-40 LT	Char léger modèle 1935 R modifié 1939	45	32	40	40
FR	Char D1 MT	Char Renault D1	35	35	10	10
FR	Char D1 MT (47)	Char Renault D1	35	35	10	10

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
FR	Char D1B MT	Char Renault D1B	35	35	16	10
FR	Char D1B MT (47)	Char Renault D1B	35	35	16	10
FR	Char D2 MT	Char Renault D2	45	40	35	30
FR	Char D2bis MT	Char Renault D2bis	45	40	35	30
FR	AMC 34 MT (37)	Automitrailleuse de Combat Renault modèle 1934 w/37mm	16	20	12	12
FR	AMC 34 MT (25)	Automitrailleuse de Combat Renault modèle 1934 YR w/25mm	16	20	12	12
FR	AMC 34 MT (47)	Automitrailleuse de Combat Renault modèle 1934 YR w/47mm	16	20	12	12
FR	AMC 35 ACG-1 MT (25)	Automitrailleuse de Combat Renault modèle 1935 ACG-1 w/25mm	25	25	12	5
FR	AMC 35 ACG-1 MT (47)	Automitrailleuse de Combat Renault modèle 1935 ACG-1	25	25	12	5
FR	AMX 38(37) MT	AMX-38 MT w/37mm	40	40	20	20
FR	AMX 38(47) MT	AMX-38 MT w/47mm	40	40	20	20
FR	AMX 39 MT	AMX-39 MT	40	40	20	20
FR	ACC 38 MT (25)	Renault ACG-1(25)	40	40	20	20
FR	ACC 38 MT (47)	Renault ACG-1(47)	40	40	20	20
FR	Somua S35	Automitrailleuse de Combat modèle 1935 S	55	36	35	25
FR	Char 2C	Char d'assaut de grand modèle	35	45	30	12
FR	Char B1 (SA34)	Renault Char B1	55	40	55	55
FR	Char B1 (SA35)	Renault Char B1	55	40	55	55
FR	Char Blbis	Renault Char B1bis	55	60	55	55
FR	AMR-35 ZT-4	Automitrailleuse de Reconnaissance Renault Modèle 35 Type ZT-4 RT	13	13	8	8
FR	AMR-35(25) SPG	Automitrailleuse de Reconnaissance Renault Modèle 35 Type ZT-3 SPPG	13	13	8	8
FR	AMC 35 ACG-2 MT	Automitrailleuse de Combat Renault modèle 1935 ACG-2	25	25	12	5
FR	Somua AU40 (47)	SAu-40 w/47mm	55	36	35	25
FR	Somua AU40 (75)	SAu-40 w/75mm	55	36	35	25
POL	Peugeot(37)	Peugeot 1918 armoured car w/37mm	10	10	4	4
POL	Peugeot(MG)	Peugeot 1918 armoured car w/MG	10	10	4	4
POL	Wz 28	Samochód pancerny wz. 28	8	8	6	6
POL	Wz 28(MG)	Samochód pancerny wz. 28 w/MG	8	8	6	6
POL	Wz 29	Samochód pancerny wz. 29	10	10	4	4
POL	Wz 29 (37)	Samochód pancerny wz. 29 w/37mm	10	10	4	4
POL	Wz 34	Samochód pancerny wz. 34	8	8	6	6
POL	Wz 34(37)	Samochód pancerny wz. 34 w/37mm	8	8	6	6
POL	FT-17(MG) LT (pol)	FT-17 w/MG	16	16	16	16
POL	FT-17(37) LT (pol)	FT-17 w/37mm	16	16	16	16
POL	7TP	7TPdw	40	17	8	8
POL	7TPM	7TPjw M	40	17	8	8
POL	7TPI	7TPjw I (9TP)	40	17	8	8
POL	R-35 LT (pol)	Char léger Modèle 1935 R	40	32	40	40
POL	Vickers 6t Type A (pol)	Vickers 6-Ton Tank Type A	13	13	4	4
POL	Vickers 6t Type B (pol)	Vickers 6-Ton Tank Type B	13	13	4	4
POL	10 TP	czternastotonowy polski - 10-tonne Polish	20	20	20	8
POL	14 TP	czternastotonowy polski - 14-tonne Polish	50	50	35	35
POL	C7P	C7P tracked tractor	40	17	8	8
BEL	FT-17(37) LT (Bel)	FT-17 w/37mm	16	16	16	16
BEL	T-15	T-15 light tank	9	9	7	7
BEL	ACG-1	Auto Blindé Lourd/ Zware Pantserwagen	25	25	10	10
NET	Pantserwagen KRA	Pantserwagen KRA	10	10	5	5
NET	Pantserwagen M.36	Landsverk L181	10	10	5	5
NET	Pantserwagen M.38	Landsverk L180	10	10	5	5
NET	Pantserwagen M.38 cmd	Commandopantserwagen M.38	10	10	5	5
NET	Pantserwagen M.39	Pantserwagen M.39	10	10	5	5
GE	Sdkfz 221	Leichter Panzerspähwagen (M.G.)	8	8	8	5
GE	Sdkfz 221 (28)	Leichter Panzerspähwagen (M.G.)	8	8	8	5
GE	Sdkfz 222	Leichter Panzerspähwagen (2 cm)	8	8	8	8
GE	Sdkfz 222 (MG)	Leichter Panzerspähwagen w/MG	8	8	8	8
GE	Sdkfz 223	Leichter Panzerspähwagen (Fu)	30	30	5	5

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
GE	Sdkfz 223 (20)	Leichter Panzerspähwagen (Fu) w/20mm	30	30	5	5
GE	Sdkfz 231 (4r)	Schwerer Panzerspähwagen (2 cm)	8	8	8	8
GE	Sdkfz 231 (6r)	Schwerer Panzerspähwagen (2 cm)	8	8	8	8
GE	Sdkfz 232 (6r)	Schwerer Panzerspähwagen (2 cm)	8	8	8	8
GE	Sdkfz 231 (8r)	Schwerer Panzerspähwagen Sd. Kfz. 231 (8-rad)	15	8	8	8
GE	Sdkfz 231 (8r) (late)	Schwerer Panzerspähwagen Sd. Kfz. 231 (8-rad) (late)	15	8	8	8
GE	Sdkfz 232 (8r)	schwerer Panzerspähwagen (Fu) Sd. Kfz. 232 (8-rad)	15	4.5	8	8
GE	Sdkfz 232 (8r) (late)	schwerer Panzerspähwagen (Fu) Sd. Kfz. 232 (8-rad) (late)	15	4.5	8	8
GE	Sdkfz 234/1	Sdkfz 234/1	30	30	8	10
GE	Sdkfz 234/2	Sdkfz 234/2	30	30	8	10
GE	Sdkfz 251/23	2 cm Hängelafette 38 auf Mittlerer Schützenpanzerwagen	30	10	8	8
GE	Pz IA	Pzkpfw I Ausf.A	13	13	13	13
GE	Pz IB	Pzkpfw I Ausf.B	13	13	13	13
GE	Pz IC	Pzkpfw I Ausf.C	30	30	20	20
GE	Pz ID	Pzkpfw I Ausf.D	30	30	20	20
GE	Pz IF	Pzkpfw I Ausf.F	80	80	50	50
GE	Pz IIA	Pzkpfw II Ausf.A	14.5	14.5	14.5	14.5
GE	Pz IIB	Pzkpfw II Ausf.B	14.5	14.5	14.5	14.5
GE	Pz IIC	Pzkpfw II Ausf.C	14.5	14.5	14.5	14.5
GE	Pz IIC (late)	Pzkpfw II Ausf.C (late)	14.5	14.5	14.5	14.5
GE	Pz IID	Pzkpfw II Ausf.D	14.5	30	14.5	14.5
GE	Pz IIE	Pzkpfw II Ausf.E	14.5	30	14.5	14.5
GE	Pz IIF	Pzkpfw II Ausf.F	30	30	15	15
GE	Pz IIG	Pzkpfw II Ausf.G	30	30	15	15
GE	Pz IIJ	Pzkpfw II Ausf.J	80	80	50	50
GE	Pz IIG Luchs	Pzkpfw II Ausf.G	30	30	20	20
GE	Pz IIL Luchs	Pzkpfw II Ausf.L	30	30	20	20
GE	Pz IIM	Pzkpfw II Ausf.M	30	30	20	20
GE	Pz 35(t)	Pzkpfw 35(t)	25	25	16	15
GE	Pz 38(t) A	Pzkpfw 38(t) Ausf.A	25	25	15	10
GE	Pz 38(t) B	Pzkpfw 38(t) Ausf.B	25	25	15	10
GE	Pz 38(t) C	Pzkpfw 38(t) Ausf.C	25	25	15	10
GE	Pz 38(t) D	Pzkpfw 38(t) Ausf.D	25	25	15	10
GE	Pz 38(t) S	Pzkpfw 38(t) Ausf.S	25	25	15	10
GE	Pz 38(t) E	Pzkpfw 38(t) Ausf.E	50	50	30	10
GE	Pz 38(t) F	Pzkpfw 38(t) Ausf.F	50	50	30	10
GE	Pz 38(t) G	Pzkpfw 38(t) Ausf.G	50	50	30	10
GE	Pz IIIA	Pzkpfw III Ausf.A	14.5	14.5	14.5	14.5
GE	Pz IIIB	Pzkpfw III Ausf.B	14.5	14.5	14.5	14.5
GE	Pz IIIC	Pzkpfw III Ausf.C	14.5	14.5	14.5	14.5
GE	Pz IIID	Pzkpfw III Ausf.D	14.5	14.5	14.5	14.5
GE	Pz IIIE(37)	Pzkpfw III Ausf.E Early w/37	30	30	30	21
GE	Pz IIIE(50)	Pzkpfw III Ausf.E w/50mm	30	30	30	21
GE	Pz IIIF(37)	Pzkpfw III Ausf.F early w/37	30	30	30	21
GE	Pz IIIF(50)	Pzkpfw III Ausf.F w/50mm	30	30	30	21
GE	Pz IIIG(37)	Pzkpfw III Ausf.G early w/37	30	30	30	30
GE	Pz IIIG(50)	Pzkpfw III Ausf.G w/50mm	30	30	30	30
GE	Pz IIIH	Pzkpfw III Ausf.H	30	60	30	30
GE	Pz IIIJ(L42)	Pzkpfw III Ausf.J early w/50mmL42	30	50	30	50
GE	Pz IIIJ(L60)	Pzkpfw III Ausf.J late w/50mmL60	30	50	30	50
GE	Pz IIIK	Pzkpfw III Ausf.K	30	50	30	50
GE	Pz IIIL	Pzkpfw III Ausf.L	57	70	30	50
GE	Pz IIIM	Pzkpfw III Ausf.M	57	70	30	50
GE	Pz IVF2(early)	Pzkpfw IV Ausf.F2 early	50	50	30	20
GE	Pz IVF2(late)	Pzkpfw IV Ausf.F2 late w/Skirts	50	50	30	20
GE	Pz IVG(early)	Pzkpfw IV Ausf.G early	50	50	30	20

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
GE	Pz IVG(late)	Pzkpfw IV Ausf.G late w/Skirts	50	50	30	20
GE	Pz IVH	Pzkpfw IV Ausf.H	50	80	30	20
GE	Pz IVJ	Pzkpfw IV Ausf.J	50	80	30	20
GE	Panther D	Pzkpfw V Ausf.D	100	80	40	40
GE	Panther A	Pzkpfw V Ausf.A	110	80	40	40
GE	Panther G	Pzkpfw V Ausf.G	110	80	50	50
GE	Tiger I	Pzkpfw VI Ausf.E	100	100	80	80
GE	Tiger II(h)	Pzkpfw VI Ausf.B (Henschel)	185	150	80	80
GE	Tiger II(p)	Pzkpfw VI Ausf.B (Porsche)	110	150	80	80
GE	Pz IIIN	Pzkpfw III Ausf.N	57	70	30	50
GE	Pz IVA	Pzkpfw IV Ausf.A	15	14.5	14.5	15
GE	Pz IVB	Pzkpfw IV Ausf.B	30	30	14.5	15
GE	Pz IVC	Pzkpfw IV Ausf.C	30	30	14.5	15
GE	Pz IVD	Pzkpfw IV Ausf.D	30	30	20	20
GE	Pz IVE	Pzkpfw IV Ausf.E	30	60	40	20
GE	Pz IVF1	Pzkpfw IV Ausf.F1	50	50	30	20
GE	SdKfz 234/4	Sdkfz 234/4	15	30	8	10
GE	Marder I (FCM36)	7,5 cm PaK40(Sf) auf Geschützwagen FCM-36(f)	45	40	20	20
GE	Elefant	Panzerjäger Tiger (H)	200	200	80	80
GE	JagdTiger	Panzerjäger Tiger Ausf. B	250	150	80	80
GE	Sdkfz 234/3	Sdkfz 234/3	15	30	8	10
GE	Aufklarer 38(t) (75)	Aufklärungspanzer 38(t) mit 7.5 cm KwK37 L/24	30	50	15	15
GE	FlkPz I	Flakpanzer I	13	13	13	13
GE	Moebelwagen	3.7 cm FlaK auf Fahrgestell Panzerkampfwagen IV (sf)	25	50	30	20
GE	Moebelwagen (4x20)	Flakvierling 2 cm FlaK auf Fahrgestell Panzerkampfwagen IV (sf)	25	50	30	20
GE	Wirbelwind	Flakpanzer IV "Wirbelwind"	16	80	30	20
GE	FG PzIIIH(Sf)	15cm sIG 33 L/11 auf Fahrgestell Panzerkampfwagen III Ausf.H (Sf)	30	60	30	30
GE	GW B2(f)	10.5cm leFH18(Sf) auf Geschützwagen B2(f)	55	60	55	55
GE	GW FCM36(f)	10.5cm leFH 16 (Sf.) auf Geschutzwagen FCM 36(f)	40	35	20	20
GE	GW H-39(f)	10.5cm leFH 18 (Sf.) auf Geschutzwagen 39H(f)	45	34	34	34
GE	Flampanzer II	Panzer II (Flamm)	13	13	7	7
GE	Flampanzer III	Flammpanzer III Ausf. M	80	80	30	30
GE	PzBe I	Panzerbefehlswagen I	13	13	7	7
GE	PzBe 35(t)	Panzerbefehlswagen 35(t)	25	25	16	15
GE	PzBe 38(t)	Panzerbefehlswagen 38(t)	25	25	15	10
GE	PzBe IIIB	Panzerbefehlswagen III B	90	90	14	14
GE	PzBe IIID	Panzerbefehlswagen III D	30	30	30	30
GE	PzBe IIIE	Panzerbefehlswagen III E	30	30	30	21
GE	PzBe IIIH	Panzerbefehlswagen III H	30	30	30	30
GE	PzBe IIIL	Panzerbefehlswagen III L	57	70	30	30
GE	PzBe IIIJ	Panzerbefehlswagen III J	57	70	30	30
GE	PzBe IV	Panzerbefehlswagen IV	90	90	20	20
GE	PzBe VA	Panzerbefehlswagen V A	100	80	40	40
GE	PzBe VIB	Panzerbefehlswagen VI B	185	185	40	40
GE	PzBeob III	Panzerbeobachtungswagen III	80	80	30	30
GE	PzBeob IV	Panzerbeobachtungswagen IV	90	90	20	20
GE	PzBeob VA	Panzerbeobachtungswagen V A	120	120	20	20
GE	Sdkfz 263 (6 Rad)	Panzerfunkwagen Sd. Kfz. 263 (6-rad)	8	8	8	8
IT	Autoblinda 40	Autoblinda 40	9	9	9	9
IT	Autoblinda 41	Autoblinda 41	19	9	9	9
IT	Autoblinda 42	Autoblinda 42	19	9	9	9
IT	Autoblinda 42 (47)	Autoblinda 42 (47)	19	9	9	9
IT	Autoblinda 43	Autoblinda 43	19	9	9	9
IT	Autoblinda 43 (47)	Autoblinda 43 (47)	19	9	9	9
IT	L5/21	Fiat 3000B (w/MG)	16	22	6	6
IT	L5/30	Fiat 3000B (w/37mm)	16	22	6	6

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
IT	L6/40	Carro Armato ("armoured vehicle") L6/40	40	30	15	15
IT	R-35 LT (it)	Char léger Modèle 1935 R	40	32	40	40
IT	M11/39	Carro Armato ("armoured vehicle") M11/39	30	30	14	14
IT	M13/40	Fiat-Ansaldo M13/40	37	30	25	25
IT	M14/41	Carro Armato M 14/41	37	30	25	25
IT	M15/42	Carro Armato M15/42	49	42	25	25
IT	P26/40	Carro Armato P 40	60	50	45	40
IT	Pz IVG(early) (it)	Pzkpfw IV Ausf.G early	50	50	30	20
IT	Somua S35 (it)	Automitrailleuse de Combat modèle 1935 S	55	36	35	25
IT	Pz IIIN (it)	Pzkpfw III Ausf.N	57	70	30	50
IT	M11/39 (cmd)	Carro Armato ("armoured vehicle") M11/39 (Cmd)	30	30	14.5	8
IT	M13/40 (cmd)	Fiat-Ansaldo M13/40 (Cmd)	42	42	6	6
RUM	AB	Leichter Panzerspähwagen (2 cm)	30	30	5	5
RUM	OA vz 27 (rum)	OA vz27 (Skoda PA III)	6	6	3	3
RUM	OA vz 30 (rum)	OA vz30 (Tatra T-72)	6	6	3	3
RUM	Tacam T-60	T-60 Model 1941 scout tank	25	35	25	25
RUM	Skoda S-I-d (rum)	T-32 (Skoda S-I-d) Assault Gun	12	12	6	6
RUM	AH-IV	R-1	12	12	6	6
RUM	R-35 LT (rum)	Char léger Modèle 1935 R	40	32	40	40
RUM	R-2	Pzkpfw 35(t)	35	35	8	8
RUM	T-3	Pzkpfw III Ausf.M	80	80	30	30
RUM	T-38 (rum)	Pzkpfw 38(t) Ausf.A	30	30	8	8
RUM	T-4G	Pzkpfw IV Ausf.G late w/Skirts	90	90	20	20
RUM	T-4F1	Pzkpfw IV Ausf.F1	90	90	20	20
RUM	R35 transformat	Char léger Modèle 1935 R	40	32	40	40
RUM	Tacam R-2	Pzkpfw 35(t)	35	35	8	8
HUN	39m Czaba A/C	39M Csaba	9	9	6	6
HUN	Toldi II	38M Toldi II	35	35	6	6
HUN	Toldi IIA	38M Toldi IIA	35	35	6	6
HUN	Toldi III	38M Toldi III	35	35	6	6
HUN	Pz 38(t) G (hun)	Pzkpfw 38(t) Ausf.G	50	50	30	10
HUN	Pz IIIJ(L42) (hun)	Pzkpfw III Ausf.J early w/50mmL42	30	50	30	50
HUN	Pz IIIL (hun)	Pzkpfw III Ausf.L	57	70	30	50
HUN	Pz IVH (hun)	Pzkpfw IV Ausf.H	50	80	30	20
HUN	Turan I	40M Turán I	50	50		
HUN	Turan II	41M Turán II	50	50		
HUN	Tiger I (hun)	Pzkpfw VI Ausf.E	110	110	26	26
HUN	Pz IVF1 (hun)	Pzkpfw IV Ausf.F1	50	50	30	20
HUN	Zrinyi II	43M Zrínyi	75	75	13	13
HUN	Nimrod	40M Nimród	28	13	6	6
BUL	Sdkfz 222 (bul)	Leichter Panzerspähwagen (2 cm)	8	8	8	8
BUL	Sdkfz 223 (bul)	Leichter Panzerspähwagen (Fu)	30	30	5	5
BUL	LT vz 35 (bul)	Lehký Tank vzor 35	35	35	8	8
BUL	R-35 LT (bul)	Char léger Modèle 1935 R	40	32	40	40
BUL	Vickers 6t Type B (bul)	Vickers 6-Ton Tank Type B	13	13	4	4
BUL	LT vz 38 (bul)	LT vz 38	30	30	8	8
BUL	Pz IVF2(early) (bul)	Pzkpfw IV Ausf.F2 early	50	50	30	20
FIN	BA-10 (fin)	Broneavtomobil 10	15	15	10	10
FIN	BA-3 (fin)	Broneavtomobil 3	15	15	6	6
FIN	BA-6 (fin)	Broneavtomobil 6	15	15	6	6
FIN	T-26 M31 A1 (fin)	T-26 model 1931 A1	15	15	15	15
FIN	T-26 M31 A3 (fin)	T-26 model 1931 A3	15	15	15	15
FIN	T-26S M32 B1 (fin)	T-26 model 1932 uparmoured	15	15	15	15
FIN	T-26 M33 B2 (fin)	T-26 model 1933 (T-26B-2)	15	15	15	15
FIN	T-37 (fin)	T37 Light Tank	6	9.5	7	6
FIN	T-37A (fin)	T-37Amphibious	6	9.5	7	6

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
FIN	T-38 (fin)	T38 Light Tank	6	9.5	9	9
FIN	T-40S T30A (MG) (fin)	T30A Light Tank (T-40S) w/MG	14	13	13	13
FIN	BT-5 (fin)	BT-5 model 1933	13	13	6	6
FIN	BT-7-2 (fin)	BT-7-2 model 1935	22	22	10	10
FIN	T-50 (fin)	T-50 light infantry tank	37	50	37	37
FIN	Vickers 6t Type A (fin)	Vickers 6-Ton Tank Type A	13	13	4	4
FIN	Vickers 6t Type B (fin)	Vickers 6-Ton Tank Type B	13	13	4	4
FIN	T-28A (fin)	T-28 Model 1934	40	30	20	20
FIN	T-28B (fin)	T-28 Model 1938	40	50	20	20
FIN	T-28E (fin)	T-28 Model 1940	80	80	20	20
FIN	T-34/76B (fin)	T-34/76B Model 1941	70	45	45	45
FIN	T-34/76C (fin)	T-34/76C Model 1942	70	45	45	45
FIN	T-34/76E (fin)	T-34/76E Model 1943	70	45	45	45
FIN	T-34/85 m43 (fin)	T-34/85 Model 1943	75	60	45	45
FIN	Pz IVJ (fin)	Pzkpfw IV Ausf.J	50	80	30	20
FIN	KV-1 (fin)	KV-1 model 1939	100	106	77	75
FIN	KV-1C (fin)	KV-1C model 1942	120	110	130	75
FIN	KV-1S (fin)	KV-1S model 1942 late	82	75	60	60
SLV	OA vz 27 (slv)	OA vz27 (Skoda PA III)	6	6	3	3
SLV	OA vz 30 (slv)	OA vz30 (Tatra T-72)	6	6	3	3
SLV	Pz IIC (slv)	Pzkpfw II Ausf.C	14.5	14.5	14.5	14.5
SLV	Pz IIF (slv)	Pzkpfw II Ausf.F	30	30	15	15
SLV	LT vz 34 (slv)	Lehký Tank vzor 34	15	15	8	8
SLV	LT vz 35 (slv)	Lehký Tank vzor 35	35	35	8	8
SLV	Lt vz 40 (Slv)	Lehký Tank vzor 40	30	30	8	8
SLV	Pz 38(t) A (slv)	Pzkpfw 38(t) Ausf.A	25	25	15	10
SLV	Pz 38(t) B (slv)	Pzkpfw 38(t) Ausf.B	25	25	15	10
SLV	Pz 38(t) C (slv)	Pzkpfw 38(t) Ausf.C	25	25	15	10
SLV	Pz 38(t) D (slv)	Pzkpfw 38(t) Ausf.D	25	25	15	10
SLV	Pz 38(t) E (slv)	Pzkpfw 38(t) Ausf.E	50	50	30	10
SLV	Pz 38(t) F (slv)	Pzkpfw 38(t) Ausf.F	50	50	30	10
SLV	Pz 38(t) G (slv)	Pzkpfw 38(t) Ausf.G	50	50	30	10
SLV	Pz 38(t) S (slv)	Pzkpfw 38(t) Ausf.S	25	25	15	10
SLV	Pz IIIN (slv)	Pzkpfw III Ausf.N	57	70	30	50
SLV	Lt vz 40 cmd (Slv)	Lehký Tank vzor 40	30	30	8	8
CRO	Wz 34 (cro)	Samochód pancerny wz. 34	8	8	6	6
CRO	Wz 34(37) (cro)	Samochód pancerny wz. 34 w/37mm	8	8	6	6
CRO	Pz IA (cro)	Pzkpfw I Ausf.A	13	13	7	7
CRO	FT-17(37) LT (cro)	FT-17 w/37mm	16	16	16	16
CRO	L6/40 (cro)	Carro Armato ("armoured vehicle") L6/40	40	30	15	6
CRO	H-39 LT (L33) (cro)	Char léger modèle 1935 H modifié 39	40	34	34	34
CRO	Somua S35 (cro)	Automitrailleuse de Combat modèle 1935 S	55	36	35	25
CRO	Pz IVG(late) (cro)	Pzkpfw IV Ausf.G late w/Skirts	50	50	30	20
CRO	Matilda II (cro)	A12 Matilda II	75	48	70	55
CRO	Pz IIIN (cro)	Pzkpfw III Ausf.N	57	70	30	50
CRO	Pz IVF1 (cro)	Pzkpfw IV Ausf.F1	50	50	30	20
JP	Type 92 Jyu-Sokosha	Type 92 Jyu-Sokosha	6	6	6	6
JP	Type 94 Te-Ke	Type 94 Te-Ke	10	12	6	4
JP	Type 95 Ha-Go	Type 95 Ha-Go	12	12	12	12
JP	Type 4 Ke-Nu	Type 4 Ke-Nu	12	12	6	6
JP	Type 97 Te-Ke (37)	Type 97 Te-Ke w/37mm	16	16	4	4
JP	Type 97 Te-Ke (MG)	Type 97 Te-Ke w/MG	12	12	7	5
JP	Type 98 Ke-Ni	Type 98 Ke-Ni	16	12	12	9
JP	Type 2 Ka-Mi	Type 2 Ka-Mi	13	13	11	9
JP	Type 2 Ke-To	Type 2 Ke-To	12	12	12	9
JP	Type 89 I-Go	Type 89 Yi-Go/Chi-Ro	17	17	17	17

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
JP	Type 97 Chi-Ha	Type 97 Chi-Ha	25	25	8	8
JP	Type 97 Shinhoto	Type 97 ShinHoTo Chi-Ha	25	25	20	20
JP	Type 1 Chi-He	Type 1 Chi-He	50	50	15	8
JP	Type 2 Ho-I	Type 2 Ho-I	50	50	15	8
JP	Type 3 Chi-Nu	Type 3 Chi-Nu	50	50	15	8
JP	Type 4 Chi-To	Type 4 Chi-To	75	75	12	12
JP	Type 3 Ka-Chi	Type 3 Ka-Chi	13	13	11	9
JP	Type 1 Ho-Ni I	Type 1 Ho-Ni I	25	25	15	7
JP	Type 3 Ho-Ni III	Type 3 Gun tank Ho-Ni III	25	25	12	12
JP	Type 1 Ho-Ni III	Type 1 Ho-Ni III	25	25	15	7
JP	Type 97 Sa-To (1x20)	Type 97 Sa-To (1x20)	6	25	15	7
JP	Type 97 Sa-To (2x20)	Type 97 Sa-To (2x20)	6	25	15	7
JP	Type 2 So-Ki	Type 2 So-Ki	16	16	6	6
JP	Type 1 Ho-Ni II	Type 1 Ho-Ni II	25	25	15	7
JP	Type 97 Shi-Ka	Type 97 Shi-Ka	25	25	8	8
JP	Type 1 Ho-Ni AOP	Type 1 Ho-Ni I	51	51	25	25
JP	Type 97 Ka-So	Type 97 Ka-So	25	25	20	20
RU	BA-10	Broneavtomobil 10	15	15	10	10
RU	BA-64	BA-64	10	6	8	8
RU	BA-64B	BA-64B	10	6	8	8
RU	BA-64DShK	BA-64DShK	10	6	8	8
RU	T-26 M31 A1	T-26 model 1931 A1	15	15	15	15
RU	T-26 M31 A2	T-26 model 1931 A2	15	15	15	15
RU	T-26 M31 A3	T-26 model 1931 A3	15	15	15	15
RU	T-26 M32 B1	T-26 model 1932 B1	15	15	15	15
RU	T-26S M32 B1	T-26 model 1932 uparmoured	25	16	16	16
RU	T-26 M33 B2	T-26 model 1933 (T-26B-2)	25	16	16	16
RU	T-26 M38	T-26 model 1938	25	16	16	16
RU	T-26 M39	T-26 model 1939 (T-26-1)	25	16	16	16
RU	T-26S M38	T-26 model 1938 screened	25	25	16	16
RU	T-26S M39	T-26 model 1939 screened	25	25	16	16
RU	T-37	T37 Light Tank	6	9.5	7	6
RU	T-37A	T-37Amphibious	6	9.5	7	6
RU	T-38	T38 Light Tank	6	9.5	9	9
RU	T-40S T30A	T30A Light Tank (T-40S)	14	13	13	13
RU	T-40S T30A (MG)	T30A Light Tank (T-40S) w/MG	14	13	13	13
RU	T-40S T30B	T30B Light Tank (T-40S)	14	13	13	13
RU	T-40S T30B (MG)	T30B Light Tank (T-40S) w/MG	14	13	13	13
RU	BT-2/BT-3(early)	BT-3/BT-2 model 1932	13	13	13	10
RU	BT-2/BT-3(late)	BT-3/BT-2 model 1932	13	13	13	10
RU	BT-4	BT-4 model 1932	13	13	13	10
RU	BT-5	BT-5 model 1933	13	13	6	6
RU	BT-7	BT-7 model 1935	15	22	13	13
RU	BT-7-2	BT-7-2 model 1935	15	22	13	13
RU	BT-7-M	BT-7-M model 1938 (A-8)	15	22	13	13
RU	T-50	T-50 light infantry tank	37	50	37	37
RU	T-60(20)	T-60 Model 1941 scout tank w/20mm	25	35	25	25
RU	T-60A(20)	T-60A Model 1942 scout tank (Amph) w/20mm	25	35	25	25
RU	T-70	T-70 Model 1942	60	40	16	16
RU	T-70A	T-70 Model 1943 (Amph)	60	40	16	16
RU	T-80(45)	T-80 light tank	70	50	16	25
RU	M3 LT(3MG) (ru)	Light Tank M3 w/3MG	44	44	10	10
RU	M3A1 LT(early) (ru)	Light Tank M3A1 w/M5	44	44	10	10
RU	Tetrarch I (ru)	Light Tank Mk VII Tetrarch	14	14	10	10
RU	T-28A	T-28 Model 1934	40	30	20	20
RU	T-28B	T-28 Model 1938	40	50	20	20

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
RU	T-28C	T-28 Model 1940	80	80	20	20
RU	T-28C (late)	T-28 Model 1940 (late)	80	80	20	20
RU	T-28E	T-28 Model 1940	80	80	20	20
RU	T-28E (late)	T-28 Model 1940 (late)	80	80	20	20
RU	T-28-85	T-28 Model 1941	80	80	20	20
RU	T-32	T-32 medium Tank	22	20	20	20
RU	T-34/76A	T-34/76A Model 1940	45	45	40	40
RU	T-34/76B	T-34/76B Model 1941	70	45	45	45
RU	T-34/76C	T-34/76C Model 1942	70	45	45	45
RU	T-34/76D	T-34/76D Model 1942-1943	70	45	45	45
RU	T-34/76E	T-34/76E Model 1943	70	45	45	45
RU	T-34/76F	T-34/76C Model 1943-1944	70	45	45	45
RU	T-34/85 m43	T-34/85 Model 1943	75	60	45	45
RU	T-34/85 m44	T-34/85 Model 1944	75	60	45	45
RU	T-34/85 m45	T-34/85 Model 1945	75	60	45	45
RU	T-43	T-43 medium tank	75	110	45	45
RU	T-44	T-43A medium tank	120	90	75	30
RU	M3A3 MT(L31) (ru)	Medium Tank M3A3(early)	37	37	12	12
RU	M3A3 MT(L41) (ru)	Medium Tank M3A3(late)	37	37	12	12
RU	M3A5 MT(L31) (ru)	Medium Tank M3A5(early)	37	37	12	12
RU	M3A5 MT(L41) (ru)	Medium Tank M3A5(late)	51	51	38	38
RU	M4A2(75) MT (ru)	Medium Tank, M4A2	100	100	15	15
RU	M4A2(76) MT (ru)	Medium Tank, M4A2	100	100	15	15
RU	M4A3(mod) MT	Medium Tank, M4A3 w/76.2mm	100	100	15	15
RU	M4A3E8(76) MT (ru)	Medium Tank, M4A3E8	100	100	15	15
RU	M4A4(75) MT (ru)	Medium Tank, M4A4	100	100	15	15
RU	Valentine I (ru)	Infantry Mk.III Valentine Mk.I	65	30	60	60
RU	Valentine II (ru)	Infantry Mk.III Valentine Mk.II	65	30	60	60
RU	Valentine III (ru)	Infantry Mk.III Valentine Mk.III	65	30	60	60
RU	Valentine IV (ru)	Infantry Mk.III Valentine Mk.IV	65	30	60	60
RU	Valentine V (ru)	Infantry Mk.III Valentine Mk.V	65	30	60	60
RU	Valentine VIII (ru)	Infantry Mk.III Valentine Mk.VIII	65	30	60	60
RU	T-35-I	T-35-I model 1935	22	35	25	20
RU	T-35-II	T-35-II model 1938	22	35	25	20
RU	KV-1	KV-1 model 1939	100	106	77	75
RU	KV-1A	KV-1A model 1940	110	110	77	75
RU	KV-1B	KV-1B model 1941	100	110	77	75
RU	KV-1C	KV-1C model 1942	120	110	130	75
RU	KV-1S	KV-1S model 1942 late	82	75	60	60
RU	KV-85	KV-85 model 1943	110	75	65	60
RU	IS-I	IS-1 Heavy Tank	102	120	90	64
RU	IS-II	IS-2 Heavy Tank	102	120	90	64
RU	IS-III	IS-3 Heavy Tank	102	120	90	45
RU	Matilda II (ru)	A12 Matilda II	75	48	70	55
RU	Churchill III (ru)	A22 Infantry Mk.IV Churchill Mk.III	88	88	76	50
RU	Churchill IV (ru)	A22 Infantry Mk.IV Churchill Mk.IV	88	88	76	50
RU	M10 GMC(late) (ru)	76mm Gun Motor Carriage, M10	60	37	25	20
RU	AT-26	T-26-4	15	15	15	15
RU	KV-II	KV-II	100	105	77	75
RU	BA-10 APC	Broneavtomobil 10 APC	15	15	10	10
RU	ZIS APC	ZIS armoured Truck	10	10	6	6
RU	Arm Rifle Coy (ZiSa) (42-43) (ru)	Armoured Rifle Coy (ZiSa) (42-43)	10	10	6	6
RU	Churchill Crocodile (ru)	Churchill Crocodile (ru)	152	152	95	50
RU	KV-8	KV-8 model 1942 w/ATO-41	110	75	65	60
RU	OT-34	T-34/76D Model 1942-1943	60	60	18	18
RU	OT-34-85	T-34/85 Model 1943	60	60	18	18

Nat	Short Name	Formal Name	Armour Turret (mm)	Armour Front (mm)	Armour Side (mm)	Armour Rear (mm)
CZH	OA vz 27	Obrněný automobil vzor 27	6	6	3	3
CZH	OA vz 30	Tatra OA vz 30 AC	6	6	3	3
CZH	PA-II Zelva	Skoda PA-II Armoured Car	5.5	5.5	3	3
CZH	LT vz 34	Lehký Tank vzor 34	15	15	12	12
CZH	LT vz 35	Lehký Tank vzor 35	25	25	16	15
CZH	R-1	AH-IV	12	12	6	6
CZH	LTP Tanque 39	LTP Tanque 39 (Peru)	30	30	8	8
CZH	ST vz. 39	ST vz. 39	32	32	12	12
CZH	Strv m/41	Stridsvagn m/41 (Sw)	50	50	8	8
SWD	L-180	Landsverk L180	8.5	8.5	6	6
SWD	L-181	Landsverk L181	15	15	6	6
SWD	Lynx m/39	Pansarbil m/39	30	30	5	5
SWD	Strv fm/31	Stridsvagn fm/31	40	40	14	14
SWD	Strv m/31	Stridsvagn m/31	9	9	7	7
SWD	Strv m/37 (swd)	Stridsvagn m/37	15	15	8	8
SWD	Strv m/21-29	Stridsvagn m/21/29	50	50	8	8
SWD	Strv m/38	Stridsvagn m/38	13	13	8	8
SWD	Strv m/39	Stridsvagn m/39	13	13	8	8
SWD	Strv m/40K	Stridsvagn m/40K	24	24	8	8
SWD	Strv m/40L	Stridsvagn m/40L	30	30	12	12
SWD	Strv m/41 (swd)	Stridsvagn m/41 (Sw)	30	30	12	12
SWD	Strv m/42	Stridsvagn m/42	80	80	25	25
SPN	BA-3 (spn)	Broneavtomobil 3	15	15	6	6
SPN	Pz IA (mod)	Pzkpfw I Ausf.A w/20mm	13	13	13	13
SPN	Pz IA (spn)	Pzkpfw I Ausf.A	13	13	13	13
SPN	FT-17(MG) LT (spn)	FT-17 w/MG	16	16	16	16
SPN	Pz IB (spn)	Pzkpfw I Ausf.B	13	13	13	13
SPN	FT-17(37) LT (spn)	FT-17 w/37mm	16	16	16	16
SPN	T-26 M32 B1 (spn)	T-26 model 1932 B1	15	15	15	15
SPN	BT-5 (spn)	BT-5 model 1933	13	13	6	6
SPN	BT-7 (spn)	BT-7 model 1935	15	22	13	13
SPN	T-28A (spn)	T-28 Model 1934	40	30	20	20
SPN	Pz IVG(late) (spn)	Pzkpfw IV Ausf.G late w/Skirts	50	50	30	20
SPN	Pz IVH (spn)	Pzkpfw IV Ausf.H	50	80	30	20
SPN	Pz IVJ (spn)	Pzkpfw IV Ausf.J	90	90	20	20
SPN	PzBe I (spn)	Panzerbefehlswagen I	13	13	7	7

PART 1: CHEAT SHEETS & COUNTERS

[20.0] COUNTERS & CHEAT SHEETS

The following counter sheets and cheat sheets can be printed seperatly. The cheat sheets should be covered in clear plastic “contact” and the counter sheets should be glued to thick cardboard and the counters cut out.

[20.1] CHEAT SHEETS

Print the cheat sheets on a doubled sided printer in colour on thick A4 paper, perhaps 80gsm or 100gsm.

If unable to print double sided, print on a single side and first cover the front side with clear plastic “contact”, Then cut this out. Then cut out the rear side and cover with clear plastic “contact”, ensuring the clear plastic “contact” overlaps the rear side. Turn this over and place the front side, face up, on this. Carefully fold over the overlapping clear plastic “contact” to create a single double sided cheat sheet. Lamination is also an option.

[20.2] COUNTER SHEETS

Print the counter sheet on a single sided colour printer using thick A4 paper, 80gsm or 100gsm.

Glue this, using PVC, onto a thick piece of cardboard. To ensure no bubbles place a heavy weight on this until its dry, ensuring no excess glue causes this to stick to the weight.

Once dry cut out the entire glued counter sheet and then glue the rear counter sheet onto the rear of the cardboard. To ensure no bubbles place a heavy weight on this until its dry, ensuring no excess glue causes this to stick to the weight.

PLAYER INITIATIVE TRACK

-4	-3	-2	-1	0	+1
+2	+3	+4	+5	+6	+7
+8	+9	+10	+11	+12	+13

Players calculate their Initiative Modifier and indicates it here. Adjust each G/T when required.

TACTICAL ATTACKER			TACTICAL DEFENDER	Game Turn First Player
Commanders Initiative rating	If Tactical Attacker – 1st Quarter (+2)	If Russian Attacking in Winter (+1)	Nationality Initiative rating	
Nationality Initiative rating	If Tactical Attacker – 2nd Quarter (+1)	If Attacking at Night, Fog, Heavy Rain/Snow (+1)	Commanders Initiative rating	Game Turn Second Player
If Operational Attacker (+1)	If Tactical Attacker – 3rd Quarter (-1)	The Quarter's are indicated in the Game-Turn Track. When Quarterly reinforcements arrive indicates the start of the next quarter.	If Strategic Attacker (+1)	
If Strategic Attacker (+1)	If Tactical Attacker – 4th Quarter (-2)		If Operational Attacker (+1)	BOTH PLAYERS: If intercepted enemy Radio Communication last G/T (+1)

[2.0] SEQUENCE OF PLAY TRACK

1. INITIATIVE PHASE, See Case [3.0]	Player Order Sub-Phase, See Case [3.1]						
2. COMMAND PHASE, See Case [4.0]	Command Points Determination Sub-Phase, See Case [5.0]	Command Control Sub-Phase, See Case [6.0]	Supply Sub-Phase, See Case [7.0]	Emplacement Sub-Phase, See Case [8.0]			
	Communicating Order Sub-Phase, See Case [9.0]	Attach & Detach Sub-Phase, See Case [12.0]	Artillery Allocation Sub-Phase, See Case [13.0]	Air Operations Sub-Phase, See Case [14.0]			
2. OPERATIONAL FIRE PHASE, See Case [16.0]	Aircraft Placement Sub-Phase, See Case [16.1]	Combat Air Patrol Sub-Phase, See Case [16.2]	Operational Aircraft Sub-Phase, See Case [16.3]	Counter Battery Fire, See Case [16.4]	Interdiction Fire Sub-Phase, See Case [16.5]	Operational Area Fire Sub-Phase, See Case [16.6]	
4. FIRST PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
5. SECOND PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
7. MORALE PHASE, See Case [29.0]	Morale Test Sub-phase, See Case [29.1]	Rout Sub phase, See Case [29.4]					
8. MOVEMENT RECORD PHASE	Weather Change Sub-phase, See Case [32.0]	Advance the G/T Marker.					

[1.7] GAME-TURN TRACK (COLD: Autumn & Spring)

COLD, WARM, DRY : Autumn or Spring	**1** 0000 - 0100 Night	**2** 0200 - 0300 Night	**3** 0400 - 0500 Night	**4** 0600 Dawn Q1 Reinforcement
5 0700 Day	**6** 0800 Day	**7** 0900 Day Q2 Reinforcement	**8** 1000 Day	**9** 1100 Day (1-3) Q3 Reinforcement
10 1200 Day (4-5) Q3 Reinforcement	**11** 1300 Day	**12** 1400 Day	**13** 1500 Day Q4 Reinforcement	**14** 1600 Day
15 1700 Day	**16** 1800 Dusk	**17** 1900 - 2000 Night	**18** 2100 - 2200 Night	**19** 2300 - 0000 Night

WEATHER CHANGE TABLE

Rank	COLD Summer, Autumn, Spring	WARM Summer, Autumn, Spring	DRY All Seasons Not Desert	DRY All Seasons DESERT
0	Clear	Clear	Clear	Clear
1	Light Rain	Light Rain	Heat Haze	Heat Haze
2	Rain	Rain	Heat Haze	Dust Storm
3	Heavy Rain	Heavy Rain	Dust Storm	Dust Storm
-	Mud	Mud	-	-

A Rank of less than 0 is 0.
A Rank of more than 3 is 3.
If Heavy Rain and weather Deteriorates, Clear becomes Mud (Rank remains at 3)

CLEAR	**Light Rain**	**Rain**	**Heavy Rain**	**MUD**
CLEAR	**Heat Haze**	**Heat Haze Dust Storm (if in desert)**	**Dust Storm**	

[2.0] SEQUENCE OF PLAY TRACK

1. INITIATIVE PHASE, See Case [3.0]	Player Order Sub-Phase, See Case [3.1]						
2. COMMAND PHASE, See Case [4.0]	Command Points Determination Sub-Phase, See Case [5.0]	Command Control Sub-Phase, See Case [6.0]	Supply Sub-Phase, See Case [7.0]	Emplacement Sub-Phase, See Case [8.0]			
	Communicating Order Sub-Phase, See Case [9.0]	Attach & Detach Sub-Phase, See Case [12.0]	Artillery Allocation Sub-Phase, See Case [13.0]	Air Operations Sub-Phase, See Case [14.0]			
2. OPERATIONAL FIRE PHASE, See Case [16.0]	Aircraft Placement Sub-Phase, See Case [16.1]	Combat Air Patrol Sub-Phase, See Case [16.2]	Operational Aircraft Sub-Phase, See Case [16.3]	Counter Battery Fire, See Case [16.4]	Interdiction Fire Sub-Phase, See Case [16.5]	Operational Area Fire Sub-Phase, See Case [16.6]	
4. FIRST PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
5. SECOND PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
7. MORALE PHASE, See Case [29.0]	Morale Test Sub-phase, See Case [29.1]	Rout Sub phase, See Case [29.4]					
8. MOVEMENT RECORD PHASE	Weather Change Sub-phase, See Case [32.0]	Advance the G/T Marker.					

[1.7] GAME-TURN TRACK (TROPICAL: All Seasons)

TROPICAL : All Seasons	**1** 0000 - 0100 Night	**2** 0200 - 0300 Night	**3** 0400 - 0500 Night	**4** 0600 Dawn Q1 Reinforcement
5 0700 Day	**6** 0800 Day	**7** 0900 Day Q2 Reinforcement	**8** 1000 Day	**9** 1100 Day (1-3) Q3 Reinforcement
10 1200 Day (4-5) Q3 Reinforcement	**11** 1300 Day	**12** 1400 Day	**13** 1500 Day Q4 Reinforcement	**14** 1600 Day
15 1700 Day	**16** 1800 Dusk	**17** 1900 - 2000 Night	**18** 2100 - 2200 Night	**19** 2300 - 0000 Night

WEATHER CHANGE TABLE

Rank	TROPICAL Wet Season	TROPICAL Dry Season
0	Clear	Clear
1	Light Rain	Light Rain
2	Rain	Rain
3	Heavy Rain	Rain
-	Mud	-

A Rank of less than 0 is 0.
A Rank of more than 3 is 3.
If Heavy Rain and weather Deteriorates, Clear becomes Mud (Rank remains at 3)

CLEAR	**Light Rain**	**Rain**	**Heavy Rain**	**MUD**

[2.0] SEQUENCE OF PLAY TRACK

1. INITIATIVE PHASE, See Case [3.0]
- Player Order Sub-Phase, See Case [3.1]

2. COMMAND PHASE, See Case [4.0]
- Command Points Determination Sub-Phase, See Case [5.0]
- Command Control Sub-Phase, See Case [6.0]
- Supply Sub-Phase, See Case [7.0]
- Emplacement Sub-Phase, See Case [8.0]
- Communicating Order Sub-Phase, See Case [9.0]
- Attach & Detach Sub-Phase, See Case [12.0]
- Artillery Allocation Sub-Phase, See Case [13.0]
- Air Operations Sub-Phase, See Case [14.0]

2. OPERATIONAL FIRE PHASE, See Case [16.0]
- Aircraft Placement Sub-Phase, See Case [16.1]
- Combat Air Patrol Sub-Phase, See Case [16.2]
- Operational Aircraft Sub-Phase, See Case [16.3]
- Counter Battery Fire, See Case [16.4]
- Interdiction Fire Sub-Phase, See Case [16.5]
- Operational Area Fire Sub-Phase, See Case [16.6]

4. FIRST PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]
- Air Support, See Case [16.1]
- Smoke Barrage, See Case [23.9]
- Indirect Fire, See Case [20.5].
- Direct Fire, See Case [20.4]
- Movement, See Case [27.0]
- Conduct Close Assault, See Case [31.0]
- Phasing Player Steps
- Return Fire, See Case [20.6]
- Opportunity Fire, See case [22.6] and Case [27.5]
- Interdiction Fire, See case [18.2]
- Non-Phasing Player Steps

5. SECOND PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]
- Air Support, See Case [16.1]
- Smoke Barrage, See Case [23.9]
- Indirect Fire, See Case [20.5].
- Direct Fire, See Case [20.4]
- Movement, See Case [27.0]
- Conduct Close Assault, See Case [31.0]
- Phasing Player Steps
- Return Fire, See Case [20.6]
- Opportunity Fire, See case [22.6] and Case [27.5]
- Interdiction Fire, See case [18.2]
- Non-Phasing Player Steps

7. MORALE PHASE, See Case [29.0]
- Morale Test Sub-phase, See Case [29.1]
- Rout Sub phase, See Case [29.4]

8. MOVEMENT RECORD PHASE
- Weather Change Sub-phase, See Case [32.0]
- Advance the G/T Marker.

[1.7] GAME-TURN TRACK (COLD: Summer)

COLD : Summer					
	1 0000 - 0100 Night	2 0200 - 0300 Night	3 0400 Dawn Q1 Reinforcement	4 0500 Day	5 0600 Day
	6 0700 Day	7 0800 Day Q2 Reinforcement	8 0900 Day	9 1000 Day	10 1100 Day
	11 1200 Day (1-3) Q3 Reinforcement	12 1300 Day (4-5) Q3 Reinforcement	13 1400 Day	14 1500 Day	15 1600 Day
	16 1700 Day Q4 Reinforcement	17 1800 Day	18 1900 Day	19 1900 Day	20 2100 Dusk
	21 2200 - 2300 Night				

WEATHER CHANGE TABLE

Rank	COLD Summer
0	Clear
1	Light Rain
2	Rain
3	Heavy Rain
-	-

A Rank of less than 0 is 0.
A Rank of more than 3 is 3.
Mud cannot form in Summer

CLEAR | Light Rain | Rain | Heavy Rain

[2.0] SEQUENCE OF PLAY TRACK

1. INITIATIVE PHASE, See Case [3.0]	Player Order Sub-Phase, See Case [3.1]						
2. COMMAND PHASE, See Case [4.0]	Command Points Determination Sub-Phase, See Case [5.0]	Command Control Sub-Phase, See Case [6.0]	Supply Sub-Phase, See Case [7.0]	Emplacement Sub-Phase, See Case [8.0]			
	Communicating Order Sub-Phase, See Case [9.0]	Attach & Detach Sub-Phase, See Case [12.0]	Artillery Allocation Sub-Phase, See Case [13.0]	Air Operations Sub-Phase, See Case [14.0]			
2. OPERATIONAL FIRE PHASE, See Case [16.0]	Aircraft Placement Sub-Phase, See Case [16.1]	Combat Air Patrol Sub-Phase, See Case [16.2]	Operational Aircraft Sub-Phase, See Case [16.3]	Counter Battery Fire, See Case [16.4]	Interdiction Fire Sub-Phase, See Case [16.5]	Operational Area Fire Sub-Phase, See Case [16.6]	
4. FIRST PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
5. SECOND PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
7. MORALE PHASE, See Case [29.0]	Morale Test Sub-phase, See Case [29.1]	Rout Sub phase, See Case [29.4]					
8. MOVEMENT RECORD PHASE	Weather Change Sub-phase, See Case [32.0]	Advance the G/T Marker.					

[1.7] GAME-TURN TRACK (COLD: Winter)

COLD : Winter	**1** 0000 - 0100 Night	**2** 0200 - 0300 Night	**3** 0400 - 0500 Night	**4** 0600 - 0700 Night
5 0800 Dawn Q1 Reinforcement	**6** 0900 Day	**7** 1000 Day Q2 Reinforcement	**8** 1100 Day (1-3) Q3 Reinforcement	**9** 1200 Day (4-5) Q3 Reinforcement
10 1300 Day	**11** 1400 Day Q4 Reinforcement	**12** 1500 Day	**13** 1600 Dusk	**14** 1700 - 1800 Night
15 1900 - 2000 Night	**16** 2100 - 2200 Night	**17** 2300 - 0000 Night		

WEATHER CHANGE TABLE

Rank	COLD Winter
0	Clear
1	Light Snow
2	Snow
3	Blizzard
-	Deep Snow

A Rank of less than 0 is 0.
A Rank of more than 3 is 3.
If Blizzard and weather Deteriorates, Clear becomes Deep Snow (Rank remains at 3)

CLEAR	**Light Snow**	**Snow**	**Blizzard**	**DEEP SNOW**

[2.0] SEQUENCE OF PLAY TRACK

1. INITIATIVE PHASE, See Case [3.0]	Player Order Sub-Phase, See Case [3.1]						
2. COMMAND PHASE, See Case [4.0]	Command Points Determination Sub-Phase, See Case [5.0]	Command Control Sub-Phase, See Case [6.0]	Supply Sub-Phase, See Case [7.0]	Emplacement Sub-Phase, See Case [8.0]			
	Communicating Order Sub-Phase, See Case [9.0]	Attach & Detach Sub-Phase, See Case [12.0]	Artillery Allocation Sub-Phase, See Case [13.0]	Air Operations Sub-Phase, See Case [14.0]			
2. OPERATIONAL FIRE PHASE, See Case [16.0]	Aircraft Placement Sub-Phase, See Case [16.1]	Combat Air Patrol Sub-Phase, See Case [16.2]	Operational Aircraft Sub-Phase, See Case [16.3]	Counter Battery Fire, See Case [16.4]	Interdiction Fire Sub-Phase, See Case [16.5]	Operational Area Fire Sub-Phase, See Case [16.6]	
4. FIRST PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
5. SECOND PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
7. MORALE PHASE, See Case [29.0]	Morale Test Sub-phase, See Case [29.1]	Rout Sub phase, See Case [29.4]					
8. MOVEMENT RECORD PHASE	Weather Change Sub-phase, See Case [32.0]	Advance the G/T Marker.					

[1.7] GAME-TURN TRACK (WARM/DRY: Summer)

WARM or DRY : Summer	**1** 0100 - 0200 Night	**2** 0300 - 0400 Night	**3** 0500 Dawn Q1 Reinforcement	**4** 0600 Day	**5** 0700 Day
	6 0800 Day	**7** 0900 Day Q2 Reinforcement	**8** 1000 Day	**9** 1100 Day	**10** 1200 Day
	11 1300 Day Q3 Reinforcement	**12** 1400 Day	**13** 1500 Day	**14** 1600 Day	**15** 1700 Day Q4 Reinforcement
	16 1800 Day	**17** 1900 Day	**18** 2000 Dusk	**19** 2100 - 2200 Night	**20** 2300 - 0000 Night

WEATHER CHANGE TABLE

Rank	WARM Summer, Autumn, Spring	DRY All Seasons Not Desert	DRY All Seasons DESERT
0	Clear	Clear	Clear
1	Light Rain	Heat Haze	Heat Haze
2	Rain	Heat Haze	Dust Storm
3	Heavy Rain	Dust Storm	Dust Storm
-	-	-	-

A Rank of less than 0 is 0.
A Rank of more than 3 is 3.
Mud cannot form in Summer

CLEAR	Light Rain	Rain	Heavy Rain
CLEAR	Heat Haze	Heat Haze Dust Storm (if in desert)	Dust Storm

[2.0] SEQUENCE OF PLAY TRACK

1. INITIATIVE PHASE, See Case [3.0]	Player Order Sub-Phase, See Case [3.1]						
2. COMMAND PHASE, See Case [4.0]	Command Points Determination Sub-Phase, See Case [5.0]	Command Control Sub-Phase, See Case [6.0]	Supply Sub-Phase, See Case [7.0]	Emplacement Sub-Phase, See Case [8.0]			
	Communicating Order Sub-Phase, See Case [9.0]	Attach & Detach Sub-Phase, See Case [12.0]	Artillery Allocation Sub-Phase, See Case [13.0]	Air Operations Sub-Phase, See Case [14.0]			
2. OPERATIONAL FIRE PHASE, See Case [16.0]	Aircraft Placement Sub-Phase, See Case [16.1]	Combat Air Patrol Sub-Phase, See Case [16.2]	Operational Aircraft Sub-Phase, See Case [16.3]	Counter Battery Fire, See Case [16.4]	Interdiction Fire Sub-Phase, See Case [16.5]	Operational Area Fire Sub-Phase, See Case [16.6]	
4. FIRST PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
5. SECOND PLAYER'S FIRE & MOVEMENT PHASE, See Case [27.0]	Air Support, See Case [16.1]	Smoke Barrage, See Case [23.9]	Indirect Fire, See Case [20.5].	Direct Fire, See Case [20.4]	Movement, See Case [27.0]	Conduct Close Assault, See Case [31.0]	Phasing Player Steps
				Return Fire, See Case [20.6]	Opportunity Fire, See case [22.6] and Case [27.5]	Interdiction Fire, See case [18.2]	Non-Phasing Player Steps
7. MORALE PHASE, See Case [29.0]	Morale Test Sub-phase, See Case [29.1]	Rout Sub phase, See Case [29.4]					
8. MOVEMENT RECORD PHASE	Weather Change Sub-phase, See Case [32.0]	Advance the G/T Marker.					

[1.7] GAME-TURN TRACK (WARM/DRY: Summer & Winter)

WARM or DRY : Winter	**1** 0100 - 0200 Night	**2** 0300 - 0400 Night	**3** 0500 - 0600 Night	**4** 0700 Dawn Q1 Reinforcement
5 0800 Day	**6** 0900 Day Q2 Reinforcement	**7** 1000 Day	**8** 1100 Day (1-3) Q3 Reinforcement	**9** 1200 Day (4-5) Q3 Reinforcement
10 1300 Day	**11** 1400 Day Q4 Reinforcement	**12** 1500 Day	**13** 1600 Day	**14** 1700 Dusk
15 1800 - 1900 Night	**16** 2000 - 2100 Night	**17** 2200 - 2300 Night		

WEATHER CHANGE TABLE

Rank	WARM Winter	DRY All Seasons Not Desert	DRY All Seasons DESERT
0	Clear	Clear	Clear
1	Light Snow	Heat Haze	Heat Haze
2	Snow	Heat Haze	Dust Storm
3	Blizzard	Dust Storm	Dust Storm
-	Deep Snow	-	-

A Rank of less than 0 is 0.
A Rank of more than 3 is 3.
If Blizzard and weather Deteriorates, Clear becomes Deep Snow (Rank remains at 3)

CLEAR	**Light Snow**	**Snow**	**Blizzard**	**DEEP SNOW**
CLEAR	**Heat Haze**	**Heat Haze Dust Storm (if in desert)**	**Dust Storm**	

TABLE [15.1] ELEMENT VISIBILITY TYPE TABLE

** Limbered artillery, AA Guns, A/T Guns, Infantry Guns, Rocket Launchers, RCL, Mortars and rockets attached to their towing vehicles/animals uses the highest Visibility Type, either the itself or its towing vehicles/animals.

* = Unlimbered Artillery, AA Guns, Rocket launchers which are unable to be manhandled cannot disperse. Any weapon being towed cannot disperse. Aircraft and bases in water cannot disperse, See Case [25.31]

							Daylight	Dawn Dusk	Night w/Moon	Night Moonless	Weather Effect (Daylight Only) W1 (¾) Lt Snow Lt Rain Heat Haze	W2 (½) Snow & Rain	W3 (¼) Blizzard & Heavy Rain	W4 (0) Fog
V5	FW190D	**All Aircraft**					48 cm	24 cm	12 cm	0 cm	Daylight W1 36 cm	Daylight W2 24 cm	Daylight W3 12 cm	Daylight W4 0 cm
V4		**Observing the fall of shot of an indirect fire attack**	170mmG K18	**Artillery (Gun or Howitzer) 160mm or greater****	12.8 cm Flak 40	**AA Guns 110mm or greater****	36 cm	18 cm	9 cm	0 cm	Daylight W1 27 cm	Daylight W2 18 cm	Daylight W3 9 cm	Daylight W4 0 cm
V3	PzKfz IV H	**AFV (Tracked, Half Tracked or Wheeled)**	Krupp-Protze (1.5-ton) (6x4)	**Truck (inc armed with Gun, Rck, Mtr)**	10.5cm LeFH18	**Artillery (Gun or Howitzer) Up to 159mm ****	24 cm	12 cm	6 cm	0 cm	Daylight W1 18 cm	Daylight W2 16 cm	Daylight W3 6 cm	Daylight W4 0 cm
	SdKfz 251/1	**Half Track (inc armed with Gun, Rck, Mtr)**	Tractor SdKfz 11	**Tractor (inc armed with Gun, Rck, Mtr)**	Flak 18 8.8cm	**Anti-Aircraft Guns from 60mm to 109mm****								

IR equip, treat night moonless as night w/moon.
IR equip with IR searchlight treat night as Dawn/Dusk.

Div	24 cm	18 cm	12 cm	9 cm	6 cm	3 cm	1 ½	¾ cm
¾	18	13 ½	9	6 ¾	4 ½	2 ¼	1 *	¼ *
½	12	9	6	4 ½	3	1 ½	¾	½ *
¼	6	4 ½	3	2 ¼	1 ½	¾	¼ *	0cm

							Daylight	Dawn Dusk	Night w/Moon	Night Moonless	Daylight W1	Daylight W2	Daylight W3	Daylight W4
V2	Cav Rifle Coy (Horse) (39-40)	**Horse Mounted (inc Horse Tow)**	10 cm	**Man Handled Mortars 100mm or greater****	15 cm sIG 33	**Man Handled Infantry Guns from 77mm to 150mm****	12 cm	6 cm	3 cm	0 cm	9 cm	6 cm	3 cm	0 cm
	M/C Rifle Coy (M/C) (39-40)	**Cycle or Motorcycle Mounted**	10.5 cm LG 40	**Man Handled RCL Guns 100mm or greater****	3.7 cm Flak 36	**Man handled Anti-Aircraft Guns up to 59mm****								
	Kubelwagen	**Car and small trucks (inc tow)**	21cm Wf42	**Manhandled Rocket Launchers****	Pak 43 8.8cm	**Man handled Anti-Tank Guns 77mm or greater****								

MODIFIERS

Shift	Target
+1	Target has moved in current Game-Turn.
+1	Target has fired in the current Game-Turn
-1	Target is "in-cover" or "dug-in" and has not moved in the current game-Turn.
-1	Target is Dispersed, if eligible*
Shift	**Observer**
+1	Observer is on Higher Elevation
-1	Observer moved in the current game-Turn.

If the target is moving it cannot use the "in-cover" or "dug-in" modifier.

WEATHER MODIFIERS

W	Weather Condition	Div
W1	Light Snow/Rain, Heat Haze	¾
W2	Snow & Rain	½
W3	Blizzard & Heavy Rain	¼
W4	Fog.	0cm

0cm = must be adjacent to sight.
¼ , ½ , ¾ = Multiply the BOR by this divisor to arrive at the weather affected Observation Range.
*Example : ¼ of 24 cm is 18 cm (¼ * 24 = 18)*
*¾ of 24 is 6 cm (¾ * 24 = 6)*

							Daylight	Dawn Dusk	Night w/Moon	Night Moonless	Daylight W1	Daylight W2	Daylight W3	Daylight W4
V1	Inf Rifle Coy (39-40)	**Foot**	Pak 42 7.5cm	**Man Handled A/T Guns up to 76mm****	Panzerschreck	**Man carried Anti-Tank Rocket Launcher**	6 cm	3 cm	1 ½cm	0 cm	4 ½cm	3 cm	1 ½cm	0 cm
	8 cm Gw 34	**Man Carried Mortars up to 99mm**	75mmIG LelG18	**Man Handled Infantry Guns up to 76mm****	10.5 cm LG 40	**Man Carried RCL up to 99mm**								

							Daylight	Dawn Dusk	Night w/Moon	Night Moonless	Daylight W1	Daylight W2	Daylight W3	Daylight W4
V0		**Special**	Visibility Types greater than V5 are treated as V5 Values lower than V0 have a BOR of 0 cm (Elements must be adjacent)				3 cm	1 ½cm	¾ cm	0 cm	2 ¼cm	1 ½cm	¾ cm	0 cm
			Observation distances less than ¼ cm are treated as 0 cm.											

TABLE [15.2] BASE OBSERVATION RANGE TABLE

Values greater than V5 are treated as V5					On Edge of Terrain Feature, Daylight			On Edge of Terrain Feature, Dawn/Dusk			On Edge of Terrain Feature, Night w/Moon			W4 Fog
	Daylight	Dawn Dusk	Night w/Moon	Night Moonless	Daylight T1	Daylight T2	Daylight T3	Dawn Dusk T1	Dawn Dusk T2	Dawn Dusk T3	T1 Night w/Moon	T2 Night w/Moon	T3 Night w/Moon	All T4 (fog)
V5	48 cm	24 cm	12 cm	0 cm	36 cm	24 cm	12 cm	18 cm	12 cm	6 cm	12 cm	6 cm	3 cm	0 cm
V4	36 cm	18 cm	9 cm	0 cm	27 cm	18 cm	9 cm	13 ½cm	9 cm	4 ½cm	6 ¾cm	4 ½cm	2 ¼cm	0 cm
V3	24 cm	12 cm	6 cm	0 cm	18 cm	12 cm	6 cm	9 cm	6 cm	3 cm	4 ½cm	3 cm	1 ½cm	0 cm
V2	12 cm	6 cm	3 cm	0 cm	9 cm	6 cm	3 cm	4 ½cm	3 cm	1 ½cm	¾ cm	1 ½cm	¾ cm	0 cm
V1	6 cm	3 cm	1 ½cm	0 cm	4 ½cm	3 cm	1 ½cm	2 ¼cm	1 ½cm	¾ cm	¼ cm*	¾ cm	¼ cm*	0 cm
V0	3 cm	1 ½cm	¾ cm	0 cm	2 ¼cm	1 ½cm	¾ cm	1 cm*	¾ cm	¼ cm*	¼ cm	0 cm*	0 cm*	0 cm

IR equip, treat night moonless as night w/moon.
IR equip with IR searchlight treat night as Dawn/Dusk.

When an element is on and in a T1, T2 & T3 Terrain features, elements on the edge can sight elements outside with no Terrain effects. When attempting to sight an element in and on the edge of a Terrain feature, use the "Edge D iv" divisor to determine the Terrain affected BOR. When an element is inside a Terrain Feature (not on the edge) use the "In Tx" Observation Distances to determine the BOR.

T1 (¾) Village or Open Wood

T2 (½) Town or Heavy Wood

T3 (¼) City or Forest, Jungle

Inside Terrain Feature Observation Ranges. Element type is not considered in this case.

	Daylight	Dawn Dusk	Night w/Moon	Night Moonless
T1	3 cm	1 ½cm	¾ cm	0 cm
T2	1 ½cm	¾ cm	0 cm	0 cm
T3	¾ cm	¼ cm	0 cm	0 cm

TERRAIN MODIFIERS

Tx	Terrain Feature	Edge Div	In Tx Day	In Tx D/D	In Tx NwM
T1	Village or Open Wood	¾	3 cm	1 ½	¾ cm
T2	Town or Heavy Wood	½	1 ½	¾ cm	¼ cm
T3	City or Forest/Jungle	¼	0 cm	0 cm	0 cm

Edge Div = On Edge of Terrain Feature BOR Divisor.
¼ , ½ , ¾ = Multiply BOR by this divisor

Day = Daylight, D/D = Dawn / Dusk, NwM = Night with Moon
In Tx = Inside Terrain feature BOR
¼ cm to 3 cm = In Terrain BOR in cms
0 cm = must be adjacent to sight.

MODIFIERS'S

Shift	Target
+1	Target has moved in current Game-Turn.
+1	Target has fired in the current Game-Turn
-1	Target is "in-cover" or "dug-in" and has not moved in the current game-Turn.
-1	Target is Dispersed, if eligible.
Shift	**Observer**
+1	Observer is on Higher Elevation
-1	Observer moved in the current game-Turn.

If the target is moving it cannot use the "in-cover" or "dug-in" modifier.

WEATHER MODIFIERS

W	Weather Condition	Div
W1	Light Snow/Rain, Heat Haze	¾
W2	Snow & Rain	½
W3	Blizzard & Heavy Rain	¼
W4	Fog.	0cm

0cm = must be adjacent to sight.
¼ , ½ , ¾ = Multiply the BOR by this divisor to arrive at the weather affected Observation Range.
*Example : ¼ of 24 cm is 18 cm (¼ * 24 = 18)*
*¾ of 24 is 6 cm (¾ * 24 = 6)*

Cross reference the Divisor and BOR to arrive at the modified BOR (Observation Range)

Div	36 cm	27 cm	24 cm	18 cm	13 ½ cm	12 cm	9 cm	6 ¾	6 cm	4 ½	3 cm	2 ¼	1	1 ½	¾ cm	¼ cm
¾	27	20 ¼	18	13 ½	10*	9	6 ¾	4 ¾	4 ½	3 ¼	2 ¼	1 ¾	¾	1 *	¼ *	0cm
½	18	13 ½	12	9	6 ¾	6	4 ½	3 ¼	3	2 ¼	1 ½	1 *	½	¾	½ *	0cm
¼	9	6 ¾	6	4 ½	3 ¼*	3	2 ¼	1 ½	1 ½	1*	¾	½ *	¼	¼ *	0cm	0cm

* = Values are rounded to the closest logical fraction, or if less than ¼ rounded to 0 cm.

FIRE TABLE CHEAT SHEET

TABLE [22.2] FIRE TABLE

		Differential																			
Indirect Fire	HARD	0	+1 +2	+3 +4	+5 +6	+7 +8	+9 +10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SOFT	-2	-1	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11 +12	+13 +14	+15 +16	+17 +18	+19 +20	+21 +24	+25 +28	+29 +32
Direct Fire (HARD/SOFT)		-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11 +12	+13 +14	+15 +16	+17 +18	+19 +20
1 SP		-	-	-	+	1	1+	2	2+	3	3+	4	4+	5	5+	6	6+	7	7+	8	8+	9
2 SP		-	-	+	1	1+	2	2+	3	3+	4	4+	5	5+	6	6+	7	7+	8	8+	9	9+
3 SP		-	+	1	1+	2	2+	3	3+	4	4+	5	5+	6	6+	7	7+	8	8+	9	9+	10
4 SP		+	1	1+	2	2+	3	3+	4	4+	5	5+	6	6+	7	7+	8	8+	9	9+	10	10+
5 SP		1	1+	2	2+	3	3+	4	4+	5	5+	6	6+	7	7+	8	8+	9	9+	10	10+	11
6 SP		1+	2	2+	3	3+	4	4+	5	5+	6	6+	7	7+	8	8+	9	9+	10	10+	11	11+
7 SP		2	2+	3	3+	4	4+	5	5+	6	6+	7	7+	8	8+	9	9+	10	10+	11	11+	12
8 SP		2+	3	3+	4	4+	5	5+	6	6+	7	7+	8	8+	9	9+	10	10+	11	11+	12	12+
9 SP		3	3+	4	4+	5	5+	6	6+	7	7+	8	8+	9	9+	10	10+	11	11+	12	12+	13
10 SP		3+	4	4+	5	5+	6	6+	7	7+	8	8+	9	9+	10	10+	11	11+	12	12+	13	13+

Key:

 # = number of D6 die to roll, a 5 or 6 results in a Hit.
+ = 1 D6 die to roll, a 6 results in a Hit.
- = No Dice to be thrown, thus no result.
If in Travel Mode or Concentrated Mode, 1 Hit can be negated by going into dispersed mode, unless doctrine does not permit this. Otherwise 1 Hit results in 1 Strength Point Casualty.

Determine the correct differential Column, if Direct Fire against either Hard or Soft Targets use the "DIR H&S" Row, if Indirect against HARD target, use the "ID HARD" Row and if indirect against SOFT, use the "ID SOFT" Row.

Cross reference the attacking elements Strengths; with the selected Column, the resulting value is the number of D6 dice to be used and the value which is required for Causality. 1, 2 up to 10 indicate the number of D6 dice which will be thrown, a score of 5 or greater results in a casualty. If a + is present, this indicates an extra D6 dice is thrown which requires a 6 to hit. In some cases only 1 D6 dice is thrown which requires a 6, such as when "+" is by itself.

Differential values which are lower than the chart allows are considered as no effect. If due to shifting left due to modifiers, a final shift beyond the leftmost column also results in a no effect.
Differential values which are higher that the chart allows count as the highest differential, the same applies to final right shifts. The maximum number of dice which can be thrown is 14, which is a 13+.

TABLE [22.4] DIRECT FIRE MODIFIERS TABLE

Mod	Terrain/Visibility Effects
+1	Element in Undispersed Mode in Plains, Steppe or Desert.
-1	Dispersed in Clear, Beach, marsh or open Wood. Dispersed in in Rough Terrain or behind a wall or embankment which provides cover. Dispersed in Level 1 Fortification, in addition to other terrain. (max -4)
-2	Dispersed in Town, Village, forest or broken terrain Dispersed in Level 2 Fortification, in addition to other terrain. (max -4) In Smoke
-3	Dispersed in City. Dispersed in Level 3 Fortification, in addition to other terrain (max -4)
-4	Dispersed in Level 4 Fortification. (max -4)

Defenders Modifiers

Mod	Target Aspect
+2	Very Large Aspect (VL)
+1	Large Aspect (L)
0	Standard Aspect (s)
-1	Small Aspect (S)
-2	Very Small Aspect (VS)

Mod	Mode Effects
+2	Element in Travel Mode Armour in Concentrated Mode & attacked from Flank or rear. Soft Transport
+1	Armour in Travel Mode & attacked from Flank or rear. Armour in Dispersed Mode & attacked from Flank or rear. Mounted or drawn by animals, or on bicycle or motorcycle. Tank Riders
-2	Reconnaissance Elements in Travel Mode.

Attackers Modifiers (Direct Fire)

Mod	Target Aspect
+1	If Elite (Morale Grade 5)
-1	If Fatigued
-1	If Unwilling (Morale Grade 1)
-1	If Exhausted
-2	Dispersed and has concentrate mode capability. In Smoke. Executing Half Fire. Executing Opportunity Fire, unless against enemy conducted close assault

TABLE [22.5] INDIRECT FIRE MODIFIERS TABLE

Defenders Modifiers

Mod	Mode Effects
+2	Element in Travel Mode Soft Transport
+1	Mounted or drawn by animals, or on bicycle or motorcycle. Tank Riders
-2	Reconnaissance Elements in Travel Mode.

Mod	Terrain Effects
+1	Element in Undispersed Mode in Plains, Steppe or Desert.
-1	Dispersed in Clear, Beach, marsh or open Wood. Dispersed in in Rough Terrain or behind a wall or embankment which provides cover. Dispersed in Level 1 Fortification. (max -4)
-2	Dispersed in Town, Village, forest or broken terrain. Dispersed in Level 2 Fortification, in addition to other terrain. (max -4)
-3	Dispersed in City. Dispersed in Level 3 Fortification. (max -4)
-4	Dispersed in Level 4 Fortification. (max -4)

Mod	Other Effects
-1	Open topped AFV and the subject of indirect fire attack.

Attackers Modifiers (Indirect Fire)

Mod	Target Aspect
+1	Artillery firing an Intensive barrage (per extra supply point expended)
+1	If Elite (Morale Grade 5)
-1	If Unwilling (Morale Grade 1)
-1	Carrying out a "shoot and scoot" indirect fire mission If Fatigued
-2	Executing any unobserved indirect fire Dispersed and has concentrated mode capacity. If Exhausted

KORP COMMANDER GENERAL MARKERS (Front #1)

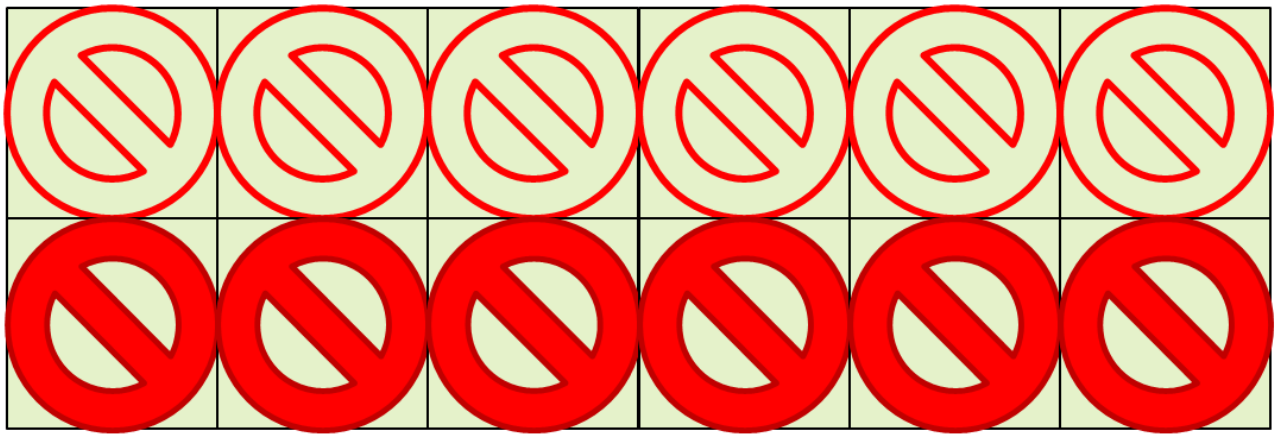
GAME TURN MARKER	ATTACKING PLAYER INITITIVE MARKER	DEFENDING PLAYER INITITIVE MARKER	OUT OF COMMAND CONTROL	OUT OF COMMAND CONTROL	OUT OF COMMAND CONTROL
SEQUENCE OF PLAY MARKER	ATTACKING PLAYER MARKER	DEFENDING PLAYER MARKER	OUT OF COMMAND CONTROL	OUT OF COMMAND CONTROL	OUT OF COMMAND CONTROL

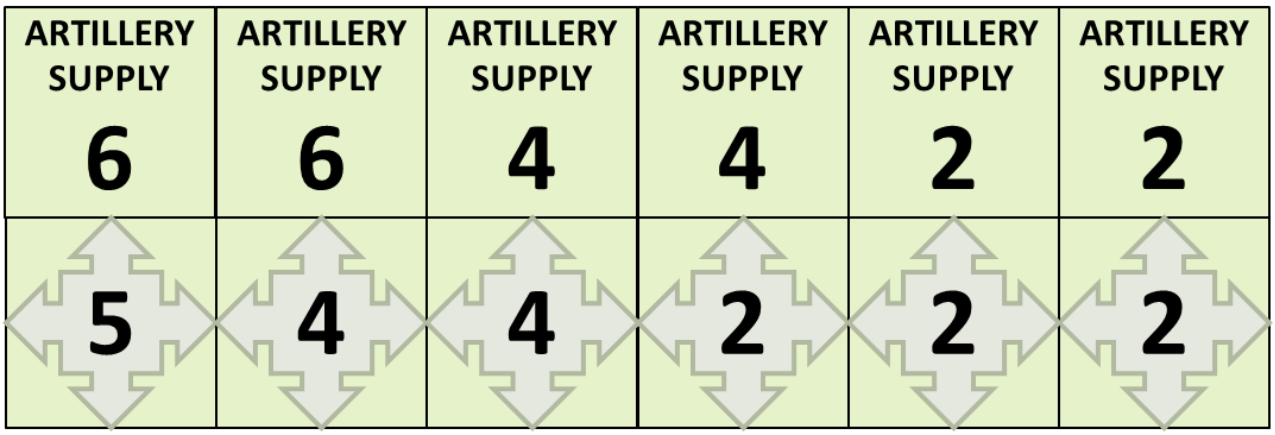
OUT OF SUPPLY	OUT OF SUPPLY	OUT OF SUPPLY	OUT OF SUPPLY	OUT OF SUPPLY	OUT OF SUPPLY
DEPLETED	DEPLETED	DEPLETED	DEPLETED	DEPLETED	DEPLETED

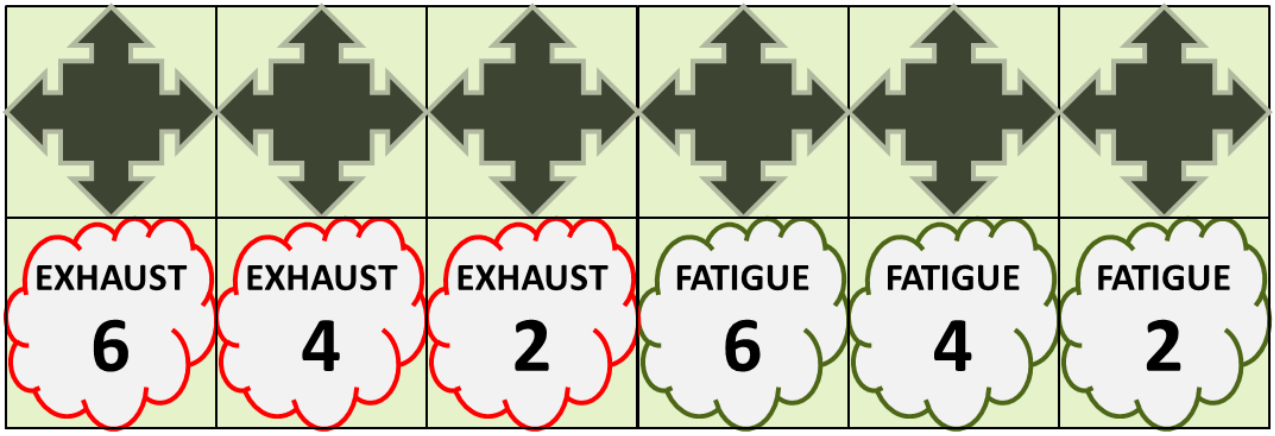
ARTILLERY SUPPLY 1	ARTILLERY SUPPLY 1	ARTILLERY SUPPLY 3	ARTILLERY SUPPLY 3	ARTILLERY SUPPLY 5	ARTILLERY SUPPLY 5
1	1	1	3	3	5

Emplaced	Emplaced	Emplaced	Emplaced	Emplaced	Emplaced
FATIGUE 1	FATIGUE 3	FATIGUE 5	EXHAUST 1	EXHAUST 3	EXHAUST 5

KORP COMMANDER GENERAL MARKERS (Front #1)







KORP COMMANDER GENERAL MARKERS (Front #2)

DEFEND ORDER	DEFEND ORDER	DEFEND ORDER	DEFEND ORDER	DEFEND ORDER	DEFEND ORDER
ATTACK ORDER	ATTACK ORDER	ATTACK ORDER	ATTACK ORDER	ATTACK ORDER	ATTACK ORDER

RETREAT ORDER	RETREAT ORDER	RETREAT ORDER	RETREAT ORDER	RETREAT ORDER	RETREAT ORDER
MANEUVRE ORDER	MANEUVRE ORDER	MANEUVRE ORDER	MANEUVRE ORDER	MANEUVRE ORDER	MANEUVRE ORDER

REST ORDER	REST ORDER	REST ORDER	UN-COMMITTED ORDER	UN-COMMITTED ORDER	UN-COMMITTED ORDER
ALLOCATE ORDER	ALLOCATE ORDER	ALLOCATE ORDER	ATTACH ORDER	ATTACH ORDER	ATTACH ORDER

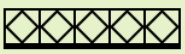
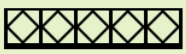
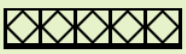
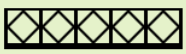
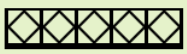
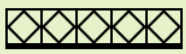
SUPPLY ALLOCATING ORDER	SUPPLY ALLOCATING ORDER	SUPPLY ALLOCATING ORDER	DETACH ORDER	DETACH ORDER	DETACH ORDER
Bridge	Bridge	Bridge	Bridge	Bridge	Bridge

KORP COMMANDER GENERAL MARKERS (Rear #2)

ORDER	**ORDER**	**ORDER**	**ORDER**	**ORDER**	**ORDER**
ORDER	**ORDER**	**ORDER**	**ORDER**	**ORDER**	**ORDER**

ORDER	**ORDER**	**ORDER**	**ORDER**	**ORDER**	**ORDER**
ORDER	**ORDER**	**ORDER**	**ORDER**	**ORDER**	**ORDER**

ORDER	**ORDER**	**ORDER**	**ORDER**	**ORDER**	**ORDER**
ORDER	**ORDER**	**ORDER**	**ORDER**	**ORDER**	**ORDER**

ORDER	**ORDER**	**ORDER**	**ORDER**	**ORDER**	**ORDER**
 Bridge	 Bridge	 Bridge	 Bridge	 Bridge	 Bridge

KORP COMMANDER GENERAL MARKERS (Front #3)

INTER-DICTION FIRE ORDER	INTER-DICTION FIRE ORDER	COUNTER BATTERY FIRE ORDER	FIRE SUPPORT ORDER	FIRE SUPPORT ORDER	FIRE SUPPORT ORDER
AREA FIRE ORDER	AREA FIRE ORDER	COUNTER BATTERY FIRE ORDER	FIRE SUPPORT ORDER	FIRE SUPPORT ORDER	FIRE SUPPORT ORDER

ABORT ORDER	ABORT ORDER	TACTICAL BOMBING MISSION ORDER	TACTICAL BOMBING MISSION ORDER	GROUND ATTACK MISSION ORDER	GROUND ATTACK MISSION ORDER
CLOSE ESCORT MISSION ORDER	CLOSE ESCORT MISSION ORDER	CAP MISSION ORDER	CAP MISSION ORDER	TACTICAL RECCE MISSION ORDER	TACTICAL OBSERVATION MISSION ORDER

3	3	3	7	7	7
1	1	1	5	5	5

9	9	9	9	9	9
Attack Point	Attack Point	Attack Point	Attack Point	Attack Point	Attack Point

KORP COMMANDER GENERAL MARKERS (Rear #4)

ORDER	ORDER	ORDER	ORDER	ORDER	ORDER
ORDER	ORDER	ORDER	ORDER	ORDER	ORDER

ORDER	ORDER	ORDER	ORDER	ORDER	ORDER
ORDER	ORDER	ORDER	ORDER	ORDER	ORDER

8	8	8	4	4	4
6	6	6	2	2	2

8	8	8	8	8	8
Attack Point	Attack Point	Attack Point	Attack Point	Attack Point	Attack Point

[21.0] CREDITS

Korps Commander v1.0
Game Design: B.A.Rea-Taylor and A. Ashton
Game Development: B.A.Rea-Taylor and A. Ashton
Play Testing Wallasey War-games Club
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Rules Editor: Peter Frederick Model
Korps Commander v2.0, v2.1, v2.2, v2.3
Rules Designer: Peter Frederick Model

Errata:

None